APRIL, 1955

Industry & Welding

FRANCHISE CIRCULATION

Titanium assembly is welded by Glenn L. Martin Co. researcher. Tests show production techniques can be successfully applied to the new metal. Story begins page 40.

New SUPERGOGGLES by Jackson

They're *wider* to allow plenty of inside room for good fit and free up and down movement where today's larger (never wider than 5½") prescription and safety spectacles are worn.

They're also *deeper*, to clear the bridge of "horn-rimmed" glasses, somewhat deeper along the temples to afford greater side protection to the eyes, without being bulky.

This width and depth, added only where needed, gives an 18% greater, well ventilated inside area, making the Supergoggles also more comfortable, cooler to wear.

Eye cups are of strong plastic, non-conductive, non-irritating. A large, screen covered vent in each cup prevents fogging. Cups are joined by a metal bar, flexible enough to fit the goggles individually, rigid enough for one-hand positioning. A large leather pad closes in softly around the nose. Lenses, held by threaded plastic retaining rings, are replaced without tools.

Series '70'

For Gas Welding, Flame Cutting & Brazing, types W-70 and WR-70 have 50 mm. lenses, shades 3 thru 6. Baffle plates over vent screens exclude light, flying particles.

For Chipping and Grinding, types G-70 and GR-70 have 50 mm. clear, hardened lenses.

Elastic Headband holds WR-70, GR-70.

Plastic Headrest holds types W-70 and G-70 more firmly. Extruded plastic, impregnable to moisture, holds its shape, is easy to sterilize. Positive locking adjustment has clearly marked hat sizes. Cork-padded sweatband is easy, inexpensive to replace. Adjustable springs, in telescopic arms, hold goggles gently against face.

Series '50' Goggles fit over narrow-frame prescription glasses and safety spectacles

Series '60' Unigoggles fit over the widest prescription and safety glasses now in use

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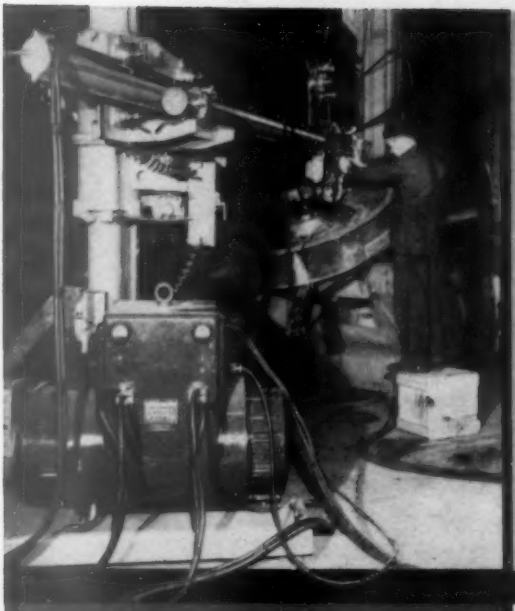

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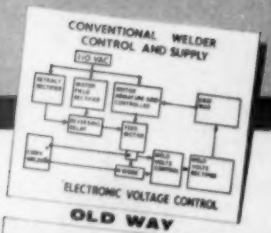
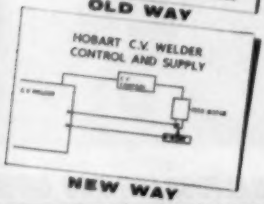


OLD WAY



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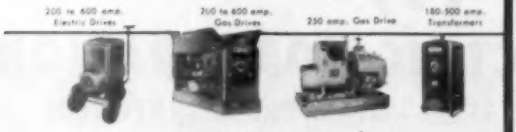

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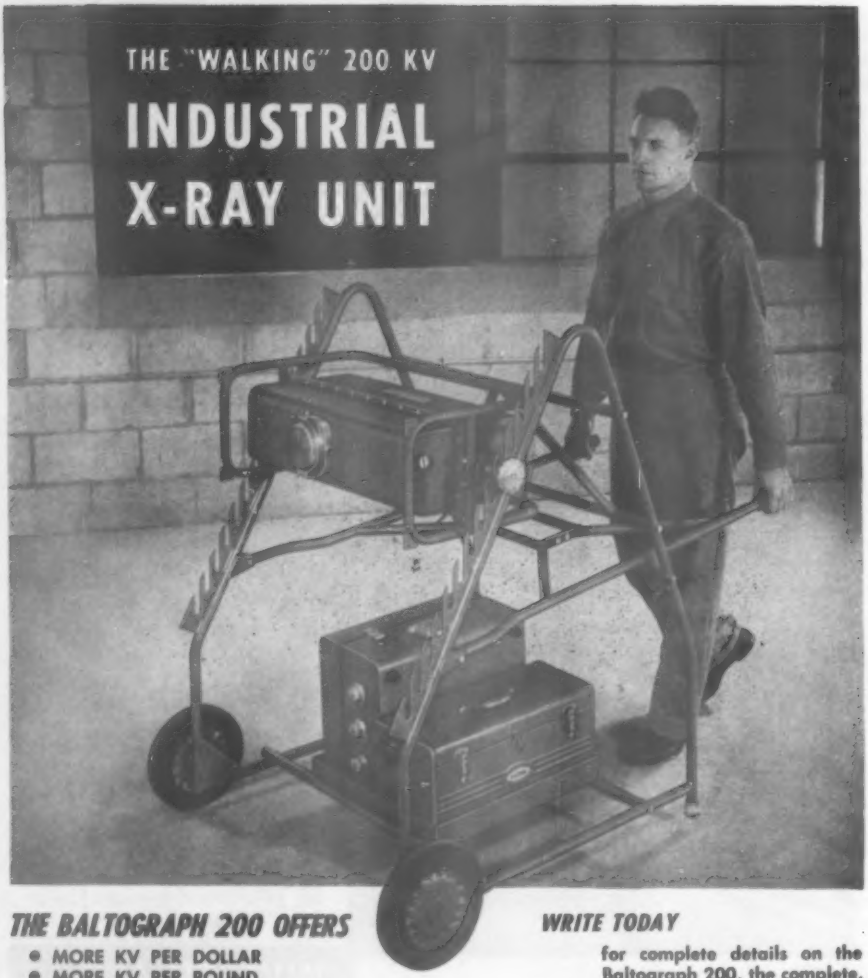

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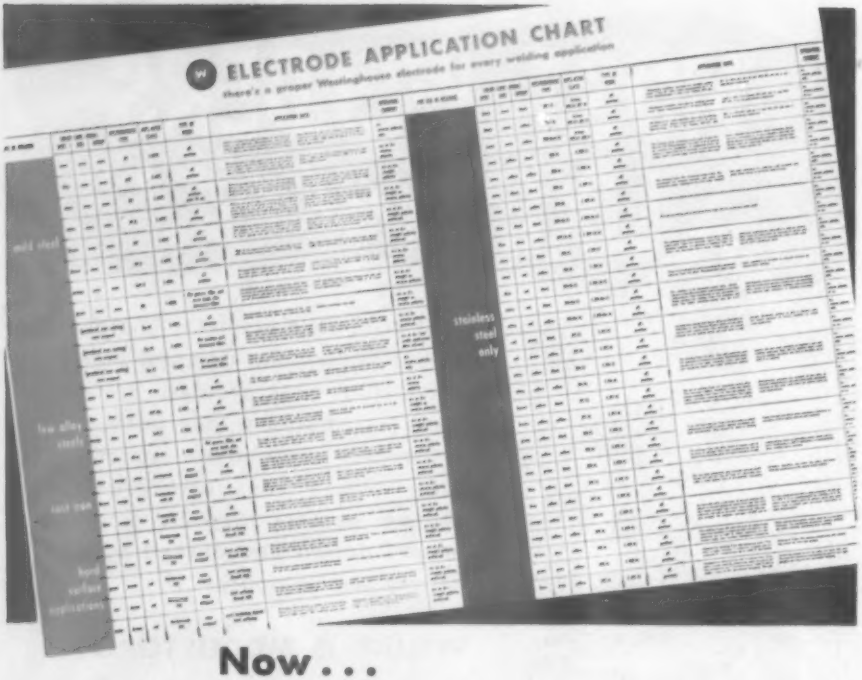

Now . . .
you can get this entirely new welding electrode chart—*ABSOLUTELY FREE!*

In doubt as to which electrode to use? This 24 x 36-inch chart will help you decide. For example: Are you losing money because of slow speeds, high spatter loss or poor fit-up on a mild-steel job? You will see that the electrode for you is Westinghouse FP, class E-6012 using d-c straight polarity or a-c.

Hot off the press! Complete in every detail. Chart lists all color coding, AWS-ASTM classes, correct welding polarities, all specifications met by each of the 53 Westinghouse electrodes. With it you can tell in one quick glance the exact electrodes to select for every one of your welding jobs.

Yes, here's the most up-to-date, most advanced electrode chart you've seen. Get yours—*absolutely free.* Don't delay. J-21878-A

YOU CAN BE **SURE**...IF IT'S Westinghouse

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Industry & Welding

APRIL, 1955
VOL. 28 No. 4

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HOW THIS NEW TORCH SPEEDS WELDING 3 WAYS!

1 LIGHTER!

Less torch weight lets operators work faster with less fatigue because it's easier to handle. This all new Marquette torch weighs one-third less than ordinary torches because its handle is made of light, high-strength aluminum alloy.

2 STRONGER!

It stays on the job. Spring loaded telescoping valve stems are protected even if torch is dropped. Rib re-enforced anodized aluminum handles withstand abuse and corrosion. Threads on tough, stainless steel torch head resist wear from changing tips and damage from careless handling.

3 COOLER!

Torch handles stay comfortably cool, keeping operators on the job with fewer work breaks. Overheated handles are completely eliminated because the stainless steel torch head is seven times less heat conductive than brass heads used in other torches.

COMPLETE NEW LINE

Four new torch models for welding and cutting all metal thicknesses are available: SUPER-JET, AERO-JET, STAR-JET and JET-O-MATIC. All four torches have fast change O-ring seals, eliminating old type hard to service gas seals . . . a positive gas-tight connection of tip to handle is made instantly with finger twist pressure.

Send for New Brochure

Learn why these new torches will do a better welding job for you. *Write today!*

When It Comes to Welding Come to

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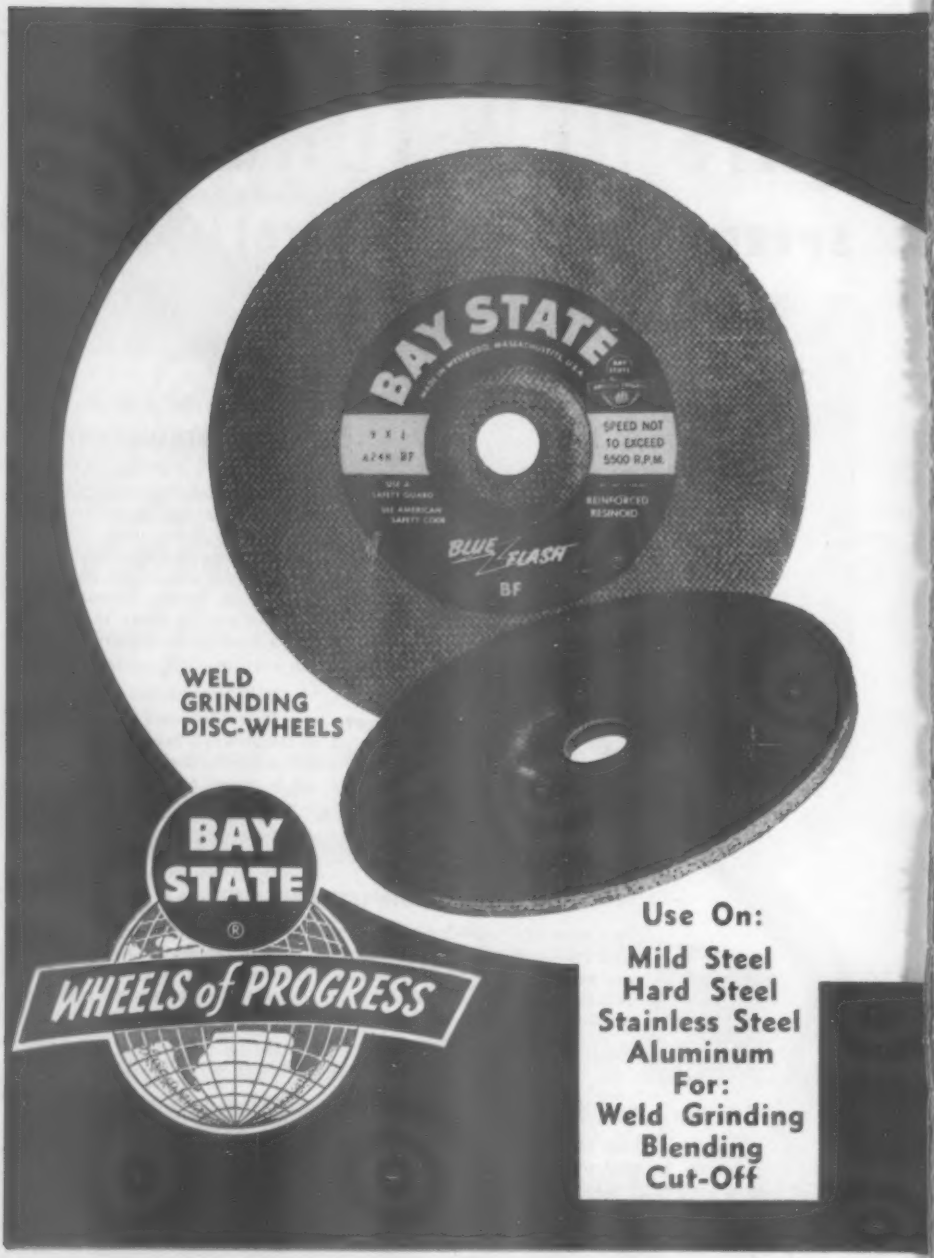

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"PRODUCTION UP 3 TIMES"
"FAR SUPERIOR TO OTHER DISCS"
"SEND US 150 MORE . . . IMMEDIATELY"
"WONDERFUL ON STAINLESS WELDS"
"YOU'VE REALLY GOT A PRODUCT"
"TERRIFIC ON ALUMINUM"

FROM field tests come these and hundreds of other enthusiastic customer reports about "BF" . . . the new Reinforced Resinoid disc-wheels that are a sensation in the weld grinding field.

These BAY STATE "BF" discs are sharper, do cut faster, remove more stock, and last longer too! . . . but you'll have to see them in action to believe it.

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cut Brazing Rejects to less than 1% in Refrigerator Compressor Dome Assembly

* Actual photo of refrigerator plant production line where 11 joints are brazed on one assembly with less than 1% rejected under Underwriter's pressure test of 1500 lbs. per sq. in.

Alloy brazing materials insure a perfect job every time . . . consistently uniform, trouble-free brazing with no rejects . . . no reworking!

No question about it—Production Brazing with Alloy Rings is the practical answer to many expensive metal joining problems. Investigate . . . production brazing can help you conquer those sky-high production costs.

Precision is of the utmost importance in successful brazing.

For infallible results insist on precision-made Alloy Rings. Special Alloy packaging methods speed production and cut waste to a minimum.

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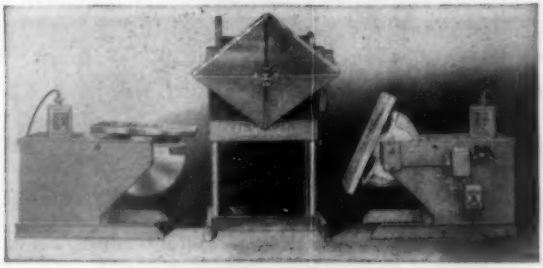
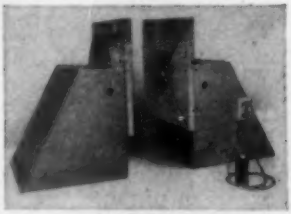
Steady, Positive, Precision Rotation for AUTOMATIC WELDING with *Aronson* Positioning Equipment.

UNIVERSAL Balanced POSITIONING
Model C 500 shown
25 lbs. to 2,000 lbs. capacity



HEAVY DUTY GEAR DRIVEN POSITIONING
Model HD 25 shown
500 lbs. to 24,000 lbs. capacity



HEAD and TAIL STOCK POSITIONING
Model HTS 5 shown
Capacities 5,000 lbs. to 160,000 lbs.

MODEL 21 (shown) SUPER GEAR DRIVEN POSITIONER with powered rotation tilt and elevation.

MODEL X-21 Powered rotation, ball bearing manual tilt and elevation.

MODEL 21-P Powered rotation and tilt, ball bearing manual elevation.

MODEL 21-E Powered rotation and elevation, ball bearing manual tilt.

MODEL X-21-PE Powered rotation, tilt and elevation, 5000 lbs. capacity @ 6" CG location.

Aronson TRACTRED Turning Rolls
Steady, positive, precision rotation for automatic welding. **MODEL T1** (shown) capacity 6,000 lbs. per unit. **MODEL T2** capacity 12,000 lbs. per unit. **MODEL T3** capacity 18,000 lbs. per unit.

HEAVY-DUTY PRECISION BUILT RUBBER TIRED TURNING ROLLS
5,000 lbs. to 150 tons capacity

Aronson **MACHINE COMPANY**
ARCADE, NEW YORK

Circle No. 10 on Reader Service Card.

of the WELDING INDUSTRY

NWSA Sets Convention For May 18 to 20

Anticipating a large turnout for its 11th Annual Convention, the National Welding Supply Association has scheduled a full program of business and social activities, according to J. N. Alcock, president, and convention committee chairman, E. C. Caluwaert. Set for May 18 through 20, the affair will be held at Chicago's Edgewater Beach Hotel and will include a series of planned get togethers for members wives.

In other NWSA news, Vice President Gordon Duff has reported that the Western Zone Meeting held recently in San Francisco drew 139 delegates, the largest number ever to attend a West Coast meeting.

Alloy Rod Names Blodgett

F. L. Blodgett has been appointed General Sales Manager of Alloy Rods Co., according to E. R. Walsh, III, Vice President in charge of Sales. Blodgett joined the company in 1950 as Sales Manager of its hardfacing and tool division, later advancing to Assistant General Sales Manager.

Reid-Avery Picks Sales Chief

Wilson A. Rohde has been named Sales Manager of the Reid-Avery Co., Inc., leading manufacturer of electrodes and welding rods. Mr. Rohde, formerly Sales Engineer specializing in inert arc welding, is a member of the American Welding Society and has been associated with Reid-Avery for ten years.

Mid-States Takes Over Viking Line of Welders

Complete assets of the Viking Welding Sales Co. have been acquired by Mid-States Welder Mfg. Co., Chicago, according to W. W. Jetter, president. The purchase includes manufacturing equipment and all patent rights on Viking welders.

These include AC transformer-type machines ranging up to 500 amps, 300 amps and 200 amps, AC welders, inert arc welding and DC rectifier-type machines rated at 200, 300 and 400 amps. Remote control devices for the latter are included.

The new machines help round out the company's line of welders.

NOW... Choose From Two Lines of MALLORY Seam Welding Wheels

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Available as rough forgings, rough machined or finish machined . . . in a wide variety of alloys.

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For many years, all Mallory seam welding wheels have been produced by a cold forging technique, especially developed by Mallory metallurgists to impart the highest physical properties. The high standards of performance of these wheels . . . long wheel life, infrequent need for dressing, consistently high strength welds . . . make them the best buy for welding applications where requirements are severe.

Now, for jobs whose requirements are less exacting, Mallory offers a new line of wheels in Mallory 3 Metal produced *without* the cold forging operation . . . at correspondingly lower prices.

Both lines are available in a wide range of sizes, as rough forgings, rough machined or finish machined parts.

Your own application is the deciding factor. Mallory engineers will be glad to help you select the wheels that will provide the best combination of performance and economy for your specific job. Write today for recommendations on your own problem.

P.R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio.

Circle No. 11 on Reader Service Card.

The Inquiring Weldor

BY JOHN WILSON

Question: How has your work in the forging shop been simplified with "Low Amp" EutecTrodes?

Roy L. Brandon, Dearborn, Mich. The cutting edges on chrome moly steel forging dies used to forge connecting rods have to be rebuilt very often. We've had very good results using EutecTrode #680. The welded dies last as long or even longer than new dies. A second troublesome job is the piston rod of a 4,000 pound air hammer which breaks quite often. Normally a new rod would have to be installed, or, the broken rod removed and sent to a special welding shop for repair. We do the job ourselves and have been getting very good results.

Question: Has Eutectic helped you save time in your repair work?

William Gomez, Providence, R. I. It certainly has. Here's an example. We recently had to remove the ⅛ x 15" sleeve inserts at the ends of the 4" thick main shaft of a huge cement mixing and laying machine. On one end, we used a hammer and chisel and it took about 3½ hours of hard work to do the job. On the other end, I used ChamferTrode and removed the insert in about 7 minutes. I used a D.C. machine, straight polarity and about 250 amps. The insert was removed clean as a whistle without damage to the shaft. What a wonderful saving in time, money and hard work.

Question: What has been your experience in working on refrigerated trucks?

Reginald Rorer, West Haven, Conn. I had one job that was real tough. The aluminum racks on the inside of a refrigerated truck had worked loose and had to be repaired. The tracks on the floor of the truck also needed repair. I tried half a dozen different aluminum welding rods but they either wouldn't bond or gave too much spatter. I tried EutecTrode #2101 and got a perfect job. The slightest warping would have ruined the job, but with EutecTrode #2101 there was no warping, no spatter and it made an excellent bond.

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EUTECTIC LOW TEMPERATURE WELDING ALLOYS clear up welding headaches . . . minimize warping, distortion, stresses and embrittlement. For time and money saving help on welding steels, aluminum, cast iron . . . and all "problem" alloys at temperatures below base metal melting points . . . and for stronger, safer production and maintenance welding just write "Welding Data Bank" for your free copy of "1954 Welding Data File" on your jobs.
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EUTECTIC WELDING ALLOYS CORP.
40-40 172nd St. Flushing, N.Y.

Circle No. 12 on Reader Service Card.

General Ceramics Adds Distributors

Two new distributors have been taken on by General Ceramics Corp., according to Fred F. Sylvester, sales manager. The Northport Co., St. Paul, Minnesota will handle the company's line of ceramic insulators and back-up rings in North and South Dakota, Minnesota and Northern Wisconsin. The Irv. M. Cochrane Co. will cover California, Arizona, Nevada, Oregon and Washington.

Six Dollars Worth Thirty In Bonus Bonanza

Miss Dorothy Bahnemann was happy when she received 534 silver dollars from the Saginaw Welding Supply Co. as her Christmas bonus —one for each week of employment. But she was even happier the next day on learning that among the silver dollars she received were 17 rare ones accidentally released by the Federal Reserve Bank ranging up to five dollars each.

Other employees also received awards for their loyal service from Jim Alcock, Saginaw Welding head.

Forms New Firm

H. J. Wagner, well known for his electrode holder designs, has announced formation of H. J. Wagner Products, Inc., Jackson, Mo. The firm will manufacture and market ground clamps and electrode holders newly designed by Mr. Wagner.

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- Bars—Hot and Cold Finished
- Sheets and Strip
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- Stainless Steels
- Tubular Products
- High Strength Steels
- Aluminum
- Industrial Supplies and Machinery
- Reinforcing Bars, Wire Fabric
- Floor Plates, Industrial Flooring

Call us for structural shapes. Our complete selection of ASTM-A7 structural shapes, including junior beams, means you can get fast delivery of the shapes you need. Our friction saw cutting gives a smooth, accurate cut; your steel arrives in good condition, ready to use. We also carry in stock all supplemental items such as high strength bolts and Dardelet rivet bolts.

Call us for plates. We can supply your plate needs with widths up to 120", thicknesses up to 10". Our modern flame cutting and shearing equipment gives closer tolerances, less waste. We carry USS Fremax free-machining plates, and the remarkable new USS "T-1" constructional alloy steel.

Call us for High Strength Steels. We offer a wide variety of these heavy duty, low alloy steels—USS COR-TEN, USS MAN-TEN and USS TRI-TEN—which have 1½ times the strength of ordinary carbon steels plus other long-life characteristics.

Call U.S. Steel Supply *first*—be sure of getting what you want, where and when you want it.

FREE—VALUABLE LITERATURE

This complete, 71-page book, "Hot Rolled Carbon Steel Structural Shapes" contains complete data on the shapes we carry—including nominal dimensions, weights, properties and dimensions for detailing. Features many diagrams and ready-reference indexing.

Also available are two other books: 1) USS COR-TEN Steel—the complete, fully illustrated story on this important high strength steel. 2) Our big, new U.S. Steel Supply Stock List.

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- ☐ Structural Shapes
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Mention specification.

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Ask your Willson distributor to show you this new 2-in-1 combination—or write for latest bulletin.

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Leaders in Research and Development of Safety Equipment Since 1870

WILLSON PRODUCTS, INC.

223 Washington St., Reading, Pa.

Circle No. 14 on Reader Service Card.

Wilson Promoted by Inco

R. M. Wilson has been named development engineer in the power field for the development and research division of International Nickel Co., Inc. With Inco's welding department since 1946, Wilson previously was with General Electric Co.'s Bloomfield, N. J. Works.

Welding Engineering Changes Name

Welding Engineering & Equipment Co., Syracuse, N. Y. has announced the change of its name to Monson Welding Sales, Inc. Organization, personnel and address of the company, however, remain the same, according to Harry Monson, company head.

Roth Chosen by All-State

Jerome M. Roth has been named Regional Manager for All-State Welding Alloys Co., Inc. to cover New Jersey, Delaware, Maryland and parts of surrounding states, according to T. D. Nast, company president. Roth will also be contact man for All-States' technical assistance program.

(More News on Page 116)

Company.....
Address.....
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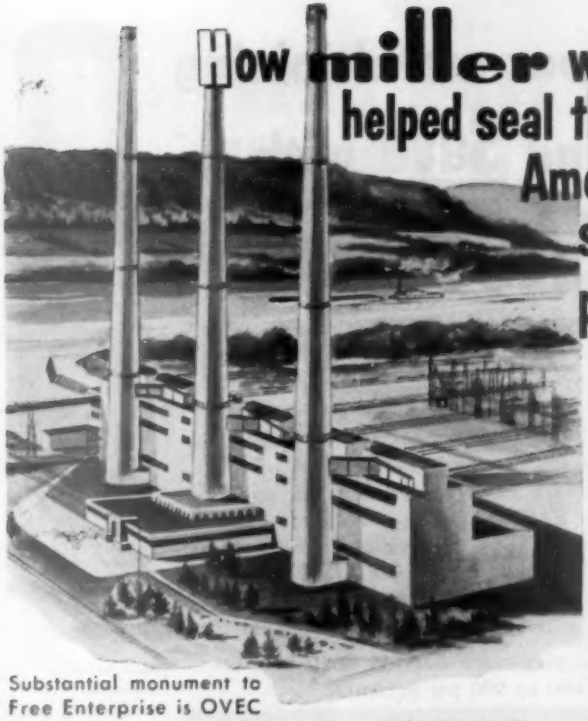
How miller welders helped seal the arteries of America's largest single purpose power plant...



Substantial monument to Free Enterprise is OVEC and IKEC, suppliers of electric power to the Atomic Energy Commission's new uranium diffusion center in Pike County, Ohio.

Ohio Valley Electric Corporation and its subsidiary, Indiana-Kentucky Electric Corporation, agreed to supply electric power to this great new atomic production center . . . *15 billion kilowatt-hours annually.*

Miller Selenium Rectifier d-c Arc Welder, in four wide-range models. For complete, concise, worthwhile information on these and other Miller Arc and Spot Welders, contact us today . . . at no obligation, of course.

Two huge generating stations are being built: The Kyger Creek Plant at Cheshire, Ohio will have five generating units of 200,000 KW each; Madison, Indiana's Clifty Creek plant will produce 1,200,000 KW with its six big generators. Each of the eleven turbo-generating units will operate off a single boiler, with super-heated steam reaching 1,050 degrees Fahrenheit under 2,000 lbs. pressure per square inch! The high temperatures and reheat, which the sponsor companies have pioneered in their own right, will make these two plants among the most economical, most efficient generating stations in the country.

These same elements, however, make the fabrication of faultless high-pressure steam lines vital . . . and extremely difficult. To accomplish this extremely important task, pipe welding specialists equipped with the maximum of engineering skill utilized the Miller Selenium Rectifier d-c Arc Welder.

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At right are the two parts of the shell with the EASY-FLO wire ring that joins them, and the small slug of EASY-FLO that joins the rod to the shell. Parts and alloy are assembled in the fixture shown below and HANDY FLUXed.

Gas-air burners are positioned to braze both joints at once.

The one operator turns out 135 floats per hour. They stand 600 to 900 psi pressure.

Photos and data courtesy of Rochester Mfg. Co., Rochester, N. Y.

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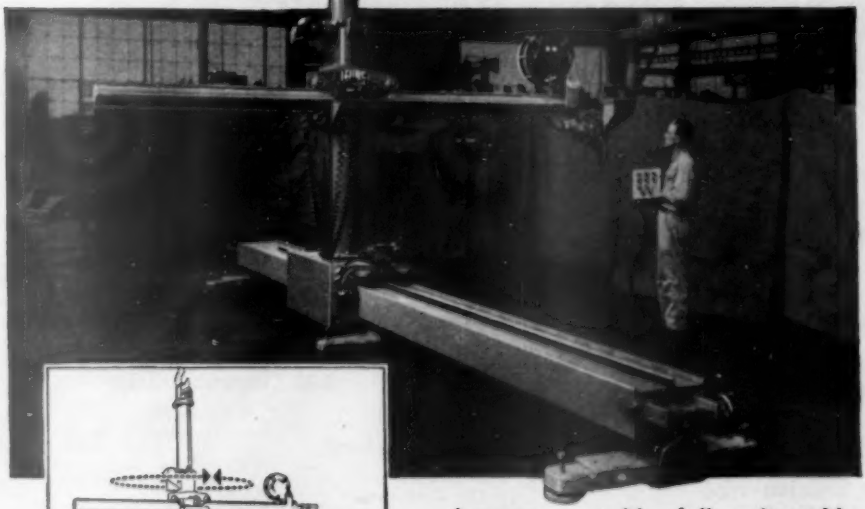

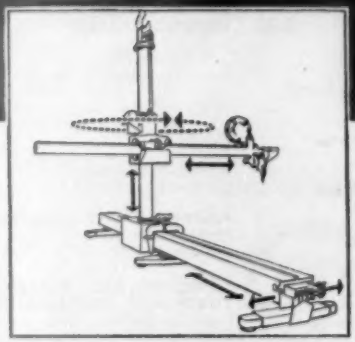

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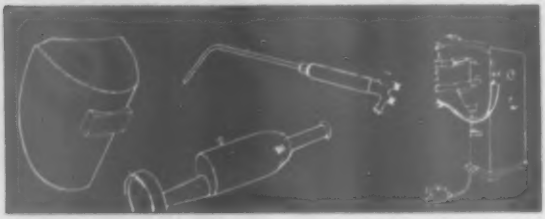
index to products advertised this month



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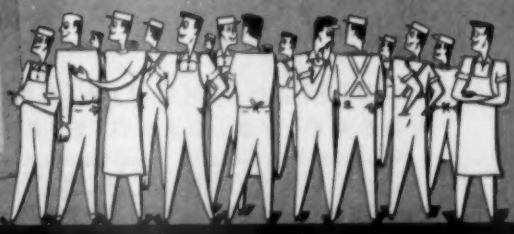
This newest Silvaloy Technical Bulletin is a complete review of up-to-date brazing procedure for joining hard carbide inserts to all types of cutting tools. The entire brazing procedure is described and fully illustrated in a step-by-step picture series.

Data is given on brazing processes, joint requirements, specifications of brazing alloys for hard carbide brazing, sandwich brazing with Plymetal and thermal stress in brazing carbide tips.

The new Silvaloy Bulletin 542 will be useful to production and design engineers, brazing technicians, etc. It has been prepared in a convenient file size and format for ready reference.

Be sure to send for your copy, without delay.



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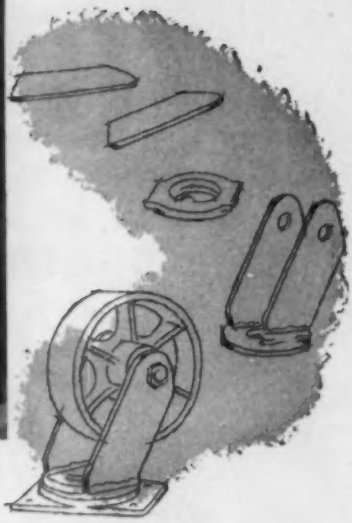

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Sigma welding is just one of the welding processes developed by LINDE's research and years of experience. HELIARC, sigma, and UNIONMELT welding form a top notch fabricating team which is now setting a new peak in industrial production. For small shops or huge production lines, from carbon steel to complex alloys and non-ferrous metals—there is a LINDE electric welding process to do the job efficiently and economically. Your local Linde representative will help you determine the best welding process for your job. Call him today for more information.

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FASTER CUTTING. A Norton flaring cup wheel, made of tough, sharp ALUNDUM* abrasive, brings cost-cutting "Touch of Gold" advantages to this weld grinding job.

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Here's why Norton flaring cup wheels are outstanding favorites for the widest range of weld grinding jobs:

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The Complete Norton Line

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• This is a seamless fiber helmet which permits easy layout and inspection of work. It features the #2 streamlined lift-front lens holder with shock-absorbing action. It has every safety and comfort feature. The helmet has an adjustable chin rest and form-fitting adjustable headgear with leather sweatband.

No. 401-7 with Stationary Lens Holder

• Here is an extremely popular all-purpose helmet which meets the safety and comfort requirements of most production and maintenance welding. It is equipped with a #7 leak-proof, telescoping lens holder. Comfort is provided by an adjustable chin rest, form-fitting headgear and a leather sweatband.

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CESCO makes a wide variety of welding helmets to meet every requirement. These include Fiber Glass Helmets, combination Hat-n-Shield and Air-Fed Helmets. These quality products are backed by years of field experience.

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Circle No. 23 on Reader Service Card.

useful free literature

The publications featured on these pages were written by experts. They are FREE to our readers. To obtain these helpful reference materials use the postcard bound into this issue.

SPEED PIPE WELDING through use of ceramic back up rings. That is the theme of a color-printed bulletin from General Ceramics Corp. Types and sizes are discussed, uses explained. **Circle No. 58 on Reader Service Card.**

MEASURING ARGON FLOW is possible with an indicating and recording meter described in an illustrated bulletin published by Elematic Equipment Corp. Complete specifications and operating information is given. **Circle No. 105 on Reader Service Card.**

WELDING PLATENS that can be used singly or combined for increased table surface are detailed in illustrated folder from Acorn Iron & Supply Co. Shown also are hold down dogs, bolts and nuts, tapered or drift pin and arm clamp. **Circle No. 86 on Reader Service Card.**

GLASS TAPE USED FOR BACK-UP purposes is described in a 52-page illustrated bulletin published by Minnesota Mining and Manufacturing Co. Also dealt with are dozens of other industrial uses. **Circle No. 106 on Reader Service Card**

CHOOSING THE RIGHT POSITIONER for a specific job is made easy with the 40 page, illustrated booklet issued by Aronson Machine Co. Photographs and simple diagrams explain function of different types. **Circle No. 107 on Reader Service Card.**

AUTOMATIC WELDING HEAD that can be used for submerged arc, inert gas shielded or open arc operation is described in a bulletin published by Reid-Avery Co., Inc. Also described are controls that permit use of any variable voltage or constant potential power source. **Circle No. 108 on Reader Service Card.**

PORTABLE SAND BLAST GUN is highlighted in a catalogue issued by Lindberg Products Co. Air pressure and consumption data are given. Capacities and suggested applications are described. **Circle No. 109 on Reader Service Card.**

HOW TO CHECK WELDING AMPERAGE accurately with a tong-test ammeter is described in an 8 page bulletin prepared by Columbia Electric Manufacturing Co. Unit measures both AC and DC, quickly, easily. **Circle No. 88 on Reader Service Card.**

PROTRACTORS, CENTER HEADS AND SPECIAL LAYOUT AIDS for weld shop pipe fitting and sheet metal work are described in an illustrated folder showing how to use the guides in difficult layout situations. Folder is available from Interstate Sales Co. **Circle No. 110.**

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DUAL-HEAD RESISTANCE WELDING MACHINES are described in a bulletin published by the Universal Welder Corporation. The units maintain two complete setups with instantaneous changeover. Literature shows typical combinations of seam, roll-spot and projection welding that are possible with these machines. **Circle No. 111 on Reader Service Card.**

PORTABLE VULCANIZING UNIT for on-the-spot cable repair is described in a 16 page, illustrated booklet issued by Joy Manufacturing Co. Other types of vulcanizers and accessories are also featured. **Circle No. 112 on Reader Service Card.**

PRESS-TYPE SPOT AND PROJECTION WELDERS are described in a well illustrated folder which offers useful how-to-weld data covering work piece thickness, electrode choice, time and current settings and resultant nugget sizes and tensile strengths. This brochure is available from Banner Mfg. Co. **Circle No. 113 on Reader Service Card.**

WELDING CABLE specifications and electrical capacities are listed in a catalogue sheet prepared by Belden Mfg. Co. Punched for easy shop notebook insertion. **Circle No. 37 on Service Card.**

SAVINGS ADD UP WHEN BRAZED CONSTRUCTION IS USED. This is the theme of "Low Temperature Brazing News" published by Handy and Harman. Attractively laid out, the colorful folder shows how brazing saved the day in a number of repair and production situations. **Circle No. 16 on Reader Service Card.**

HOW ONE WELD SHOP INCREASED PROFITS is the subject of a folder available from Eutectic Welding Alloys Corp. which shows the operator which alloys to use for cast iron, aluminum, steels and copper. This part of the folder is illustrated and can be used as a handy shop poster for easy reference. **Circle No. 114.**

When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made downhand — that's efficient welding!

Welders spend more time welding — do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

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Similarly Airco produces station regulators designed to operate on low-pressure pipe line systems which provide uniform gas pressures wherever required. Here, too, a single setting eliminates the necessity of frequent, time consuming readjustments.

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SWEAT SOLDERING AND TINNING OPERATIONS are explained in an illustrated bulletin offered by Alpha Metals, Inc. Easy application of a new paste-type solder is explained in detail. **Circle No. 115 on Reader Service Card.**

ARC CUTTING AND GOUGING case histories are presented in a pocket size pamphlet issued by Arcair Co. A brief introduction explains the principles of the process. Operating data is given for each problem discussed. **Circle No. 63 on Service Card.**

SAFETY HATS AND CAPS, as well as cap-helmet combinations, are pictured and described in detail in a bulletin from Jackson Products, Inc. Cut away diagrams illustrate models. Complete parts price list is included. **Circle No. 116 on Reader Service Card.**

MANGANESE BRONZE ELECTRODE that welds bronze and yellow brasses without preheat is described in an illustrated bulletin prepared by Ampco Metal, Inc. Chemical and mechanical properties are listed. **Circle No. 117 on Reader Service Card.**

AN 8-PAGE BROCHURE gives full photo treatment to the complete line of positioning equipment for welding and manufacturing operations produced by Eisler Engineering Co., Inc. Diagrams and specification charts supplement the pictures. **Circle No. 118 on Service Card.**

SAFETY GLASSES WITH COLORED FRAMES and corrective lenses are shown in a beautiful full-color brochure published by United States Safety Service Co. A variety of styles and types for men and women are featured. **Circle No. 119 on Service Card.**

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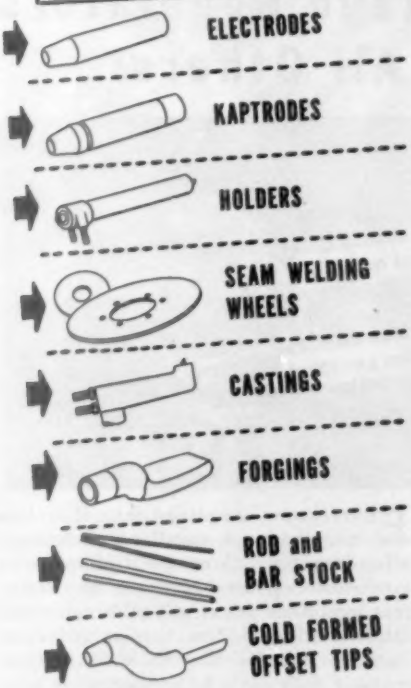

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18 GRADES OF ALUMINUM BRONZE are described in an informative technical bulletin prepared by WW Alloys, Inc., Div. of Fansteel Metallurgical Corp. A property breakdown and suggested applications are given for each metal. A valuable addition to the weld shop research library. **Circle No. 120 on Reader Service Card.**

GRINDING WHEELS with reinforcement rings imbedded in the abrasive are featured in an attractive brochure published by Colonial Abrasive Products Co. Cutaway photos help explain how rings strengthen wheel, increase safety, yet abrade away so as not to shorten durability.

FILLER METALS FOR WELDING are featured in a new chart prepared by Arcos Corp. Each rod and electrode is identified by the metal on which it is used, forms available, and welding methods with which it is used. **Circle No. 122 on Reader Service Card.**

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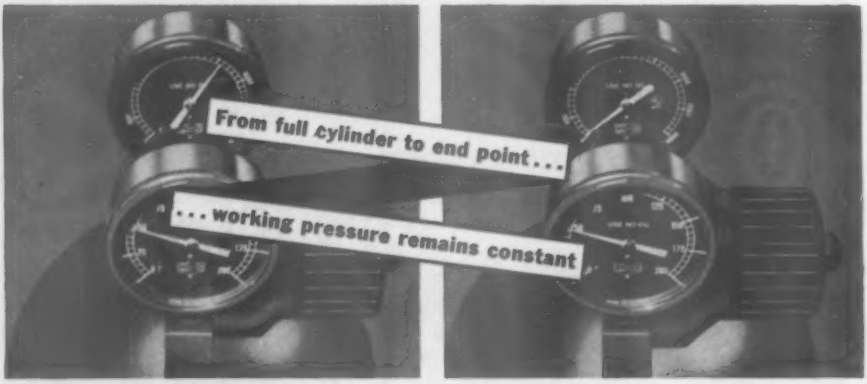

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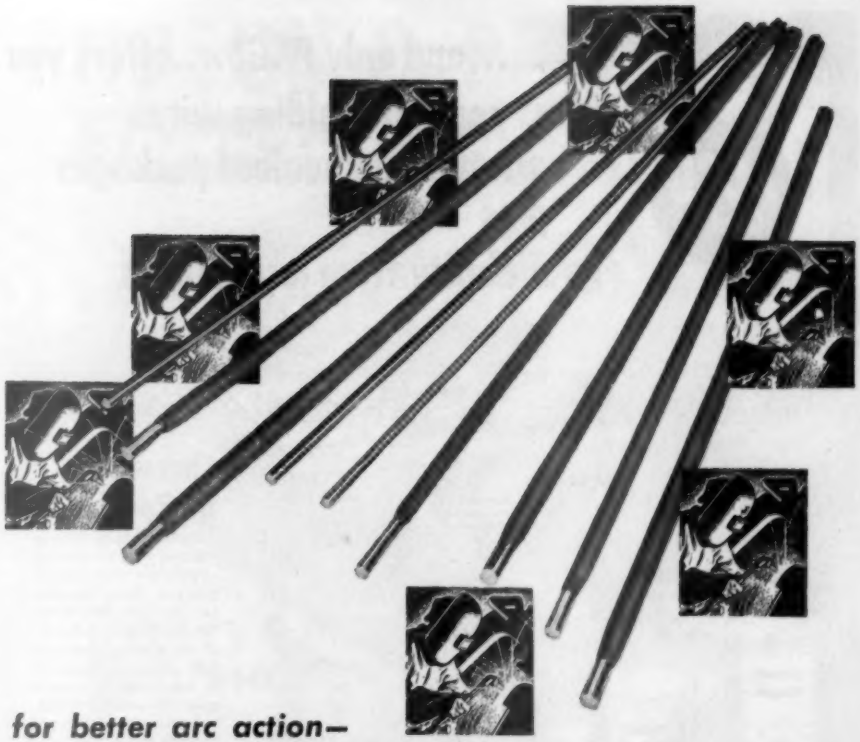

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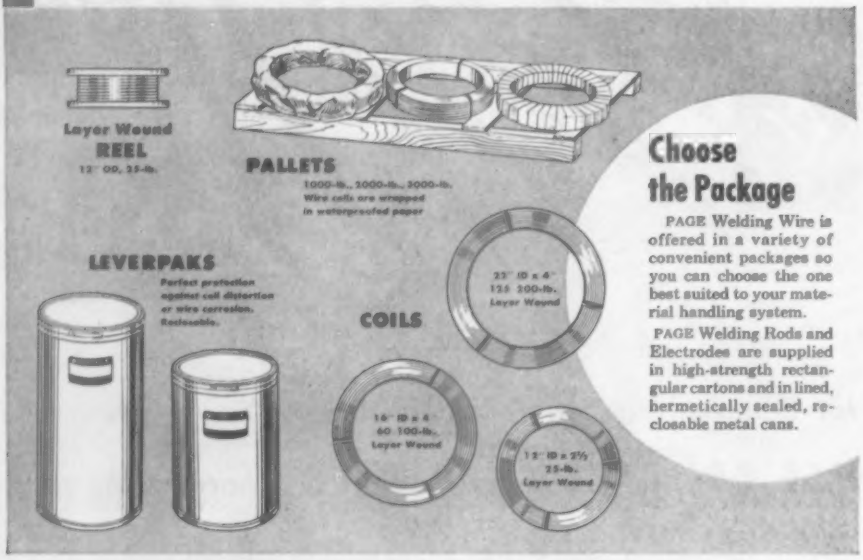

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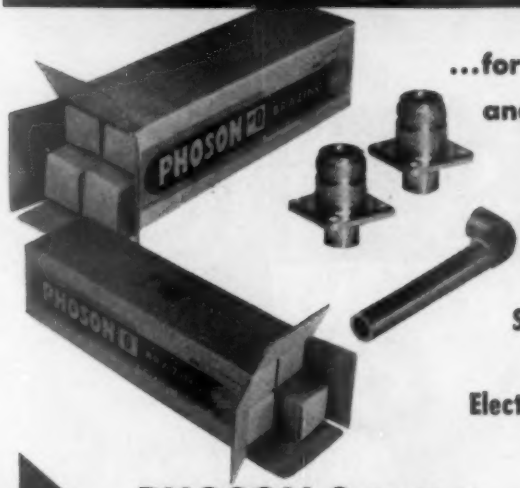

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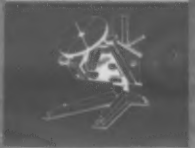

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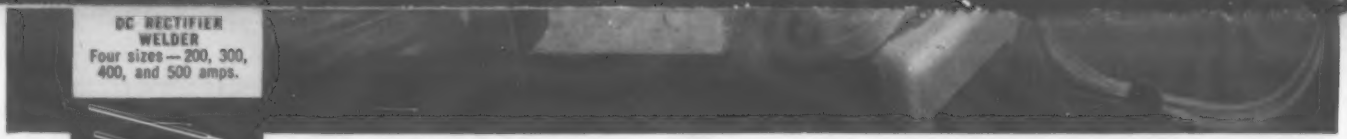

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Specially built chamber containing inert gas atmosphere is often used for fusion welding small titanium parts.

Manual inert arc is most commonly used since design and size limit work that can be done in gas chamber.

PRODUCTION LINE METHODS

By L. BARRETT and H. D. JUSTIS

Researchers use inert-arc process to by-pass problems of embrittlement and loss of ductility. Here are interesting results of tests made at Glenn L. Martin Co.

INCREASED use of titanium in the aircraft industry has led Glenn L. Martin Co. to seek production methods for fusion welding. In the process, simulated production assemblies were built, welded and thoroughly tested. Using procedures outlined below it was found that titanium could be fitted successfully into production-line operation.

At temperatures above 1400°F titanium tends to absorb oxygen, nitrogen and hydrogen from the air. If permitted, this would result in embrittlement and loss of ductility. Thus the Martin Co. adopted the inert gas shielded process with a non-consumable tungsten electrode. With this method, a protective "shield" of inert gas surrounds the affected parts excluding air and contaminating gases it contains.

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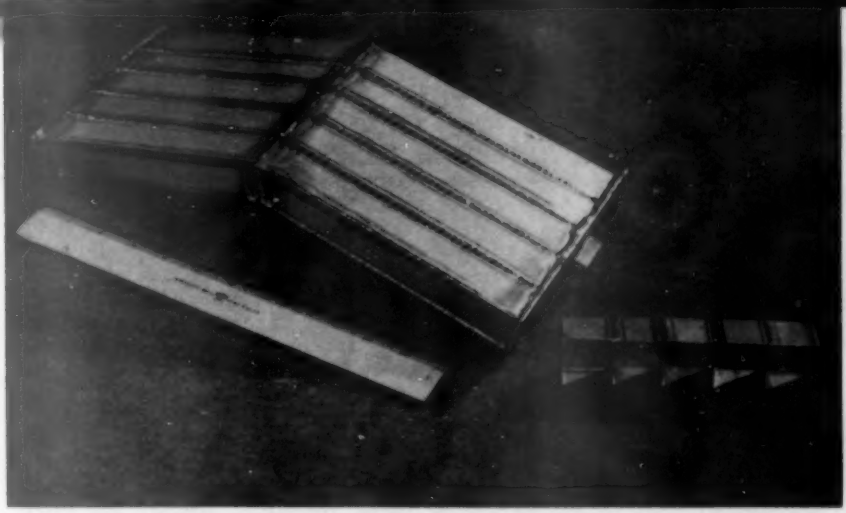


Drilled aluminum bars served multiple purpose in assembly of this fusion welded rectangular duct section. Used as alignment guides, bars also served as metallic back-up and as source of helium for additional back-up protection.

FOR WELDING TITANIUM

There are two methods for applying the inert gas shield. The first is by welding inside a chamber filled with a controlled, inert gaseous atmosphere—usually helium. This is done when only small parts are to be welded, or when design prohibits welding outside the chamber.

The other method is the one most frequently used. In this case, the weld puddle and adjacent critical arears are protected from contamination by passing shielding gas—

EFFECTS OF PRESSURE ON WELDED TITANIUM RECTANGULAR DUCT		
Air Pressure Applied		Deflection
75 psi		0
100 psi	Normal Operating Condition	0
250 psi		1/16
300 psi		3/32
350 psi		1/8
375 psi		Leak in weld at mitred joint

Simulated production assemblies were welded and

usually argon—through a standard tungsten arc welding torch.

As a further precaution, a back-up is often provided — either a metal tool or an inert gas, depending upon the nature of the joint design and the thickness of material. Heavy gauge panels are usually backed up with helium gas, thinner gauges with metal. Both aluminum and copper are used for this purpose since neither will pick up titanium. Experience has shown that copper does not mar so easily and can be cleaned more readily.

Tests were conducted to determine physical properties of titanium after fusion welding. Test panels used were commercially pure titanium RC70, ranging in thickness from .020 to 0.102. Filler wire was TI-75A. Heavier panels were backed with helium, thinner panels with copper. Argon was used as the shielding gas, and welding was done by shop operators using standard equipment in a normal atmosphere.

After welding, panels were stress relieved at 950°F. Standard tensile and bend test coupons were cut from the panels and prepared for testing. All specimens failed in the base metal rather than in the weld.

Bend test specimens were bent over a 10T diameter (10 times thickness of test piece) to 180°. All test specimens in this particular lot bent satisfactorily without failure. Previous bend tests had been made, using smaller diameters for bend radii, but most tests under 10T diameter failed before a 180° bend was reached. Material used in these bend tests was .090 to .102 thick. Thinner material can be bent to smaller radii satisfactorily.

To develop data for use in engineering designs, several assemblies simulating those to be used in production were fabricated and tested.

Low Pressure Duct

The first of these was a section of ducting designed for low pressure operating conditions. The cross section of this duct is oval, measuring approximately 1¾ inches across the flat, by 8 inches wide. Material used was .020 gauge RC70 titanium sheet. This section was made by forming the two halves to produce a flange approximately $\frac{1}{16}$ inch high when the two halves were tack-welded together.

To insure against oxidation inside the duct during welding, ends were plugged with wooden blocks cut to fit. One block had a ¼" hole drilled in it through which helium gas would be introduced as a back up during welding. For added protection against contamination on

Authors Justis and Barrett, both Research Engineers with the Glenn L. Martin Co., inspect typical production welded titanium assembly.

thoroughly tested . . .

the outside, copper bars were clamped in place alongside and parallel to the longitudinal seam.

Welding was done manually, using standard inert arc equipment and argon shielding. After the two halves were welded together, titanium plates were welded on each end, with a machined titanium nut welded on one end. This was used for attaching an air line during pressure testing.

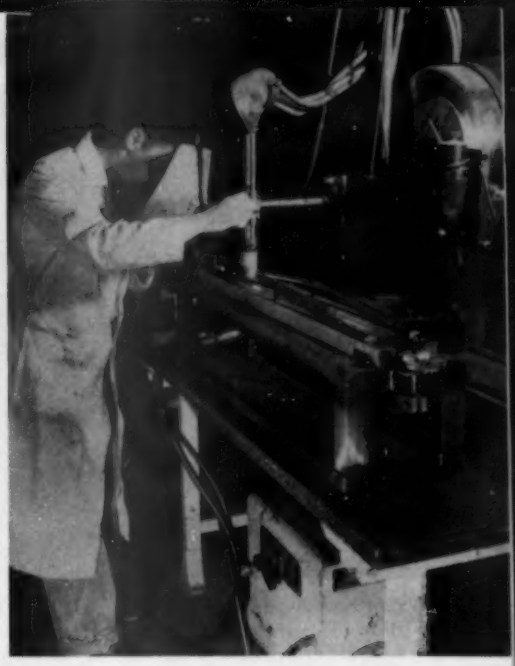
The duct so tested withstood 27½ psi pressure before failing. Failure occurred in the area adjacent to the weld.

More Testing

A second test was made, using a section of ducting fabricated of RC70 titanium sheet, .020 gauge. The sheet was sheared, rolled into a 4½" diameter tube and butt welded. It was then placed in a specially constructed fixture consisting of two copper hold-down bars, mounted on an angle iron stand. A copper tube, slightly under 4½ inches in diameter, was inserted inside the rolled titanium sheet. This tube served not only as a part of the fixture for holding the titanium tube in place, but also as a back-up for welding the butt joint. After the copper tube was inserted in the titanium tube, it was clamped in the welding fixture so as to align the butted edges of the titanium tube between the bevelled edges of the copper hold-down bars.

Automatic inert arc welding was used to weld the tube. Filler wire was not used. Welding speed was approximately 20 inches per minute.

After the tube was welded, it was cut into three sections. Cuts were made so as to produce mitred joints. These mitred joints were manually welded, using argon as the shielding gas through the torch. To protect the inside of the joint from contamination, ends of the tube were plugged with wooden discs. A ¼ inch hole was drilled in the discs to permit introduction of helium gas into the tube during welding. A constant flow of helium was maintained throughout the welding cycle.

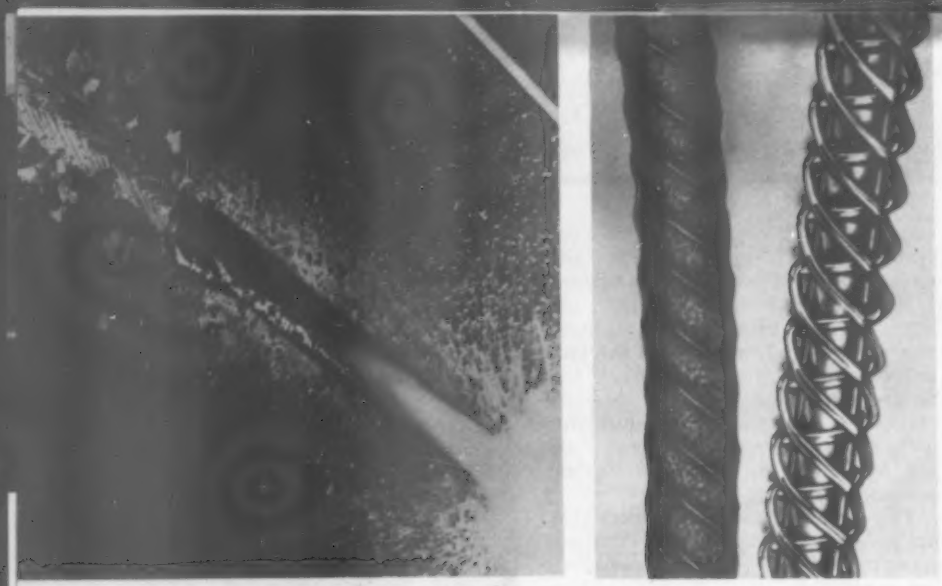


Automatic inert arc equipment can be used to successfully weld a variety of titanium assemblies on a production basis.

Pressure Test

After the mitred joints were welded, plates were welded on each end of the duct for the purpose of pressure testing. The duct was pressure tested to 275 psi. At this point one end plate burst open. This was caused by the fact that material for the end plates was too

(Continued on Page 76)



Continuous coated electrode (right) for use in automatic submerged arc welding (left) consists of a single central solid core wire around which four wires are wound. Entire unit is flux coated, leaving outer wires exposed for electrical contact.

An INDUSTRY & WELDING Overseas Report on . . .

Coated Wire for Automatic Welding

DEVELOPED after extensive trials, a new continuous heavily coated electrode for automatic arc welding is being marketed in England by Murex Welding Processes, Ltd. The electrode is said to be suitable for use with little or no modification on all types of D-C automatic welding machines designed for continuous coated electrode.

Originally developed for ship and pressure vessel fabrication, the electrode can be used in general welding of square or prepared butt joints and positioned fillets welds where high mechanical properties or good radiographic results are required. The basic flux which coats the electrode makes possible its use for welding of "hard-to-weld" steels or for making joints in mild steel or medium tensile steels under conditions of contraction restraint.

Basically, the electrode has a specially designed construction consisting of a single inner layer of mild steel wire of small diameter and four outer layers of mild steel wire which are also small in diameter. These are wound in opposition around the central solid core wire, the entire unit being coated with a flux, leaving the outer surface of the outer layer exposed for contact with the current-carrying jaws.

Due to its structure, the outer

reinforcing wires are not wound in a true helix, but take the form of a series of definite bends, each bend securely interlocking the inner, thus eliminating unwinding.

Anchor Flux Coating to Wire

This method of manufacture is said to firmly anchor the flux coating to the wire, reducing splay tendencies at the arc and insuring a shallow cup which facilitates easy striking. The definite projection present at each bend also combines to form a series of excellent electrical contacts and tend to maintain a clean feed tube, contact jaws and nozzle.

Since the outer wires are not smooth helices, the lengths of wire between crossing are approximately straight and, while leaving sufficient wire exposed to provide electrical contact, makes it possible to embed more of the outer wires in the flux than is normal, resulting in reduction of spatter losses and an ability to withstand higher welding currents without overheating.

The structure further provides for a higher flux content than is usual. This permits higher rates of weld metal deposition, and quieter, steadier burn-off which reduces arc length fluctuations and insures stable welding conditions.

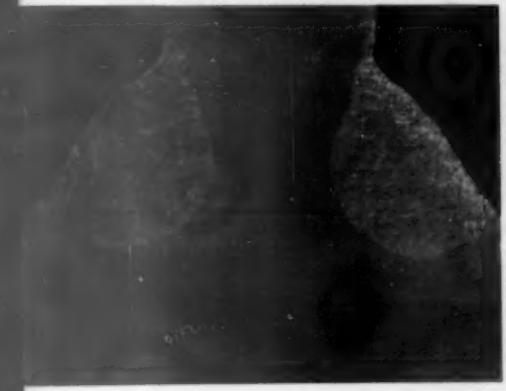
The coating has been designed to allow for a considerable reduction in excess build-up of weld metal on surface deposits, resulting in economy of use, a superior weld profile and surface appearance and a good root "wash." Moreover, spatter produced is a fine spray with relatively few coarse globules, which may be readily removed by a wire brush.

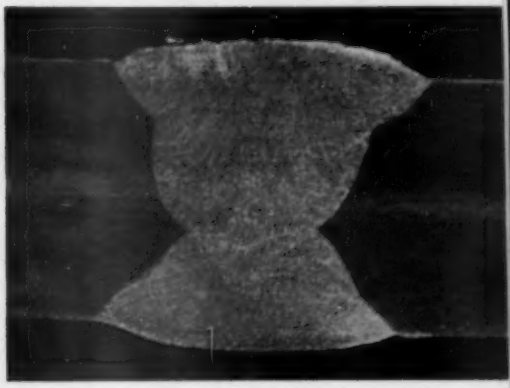
Electrode Must Be Dry

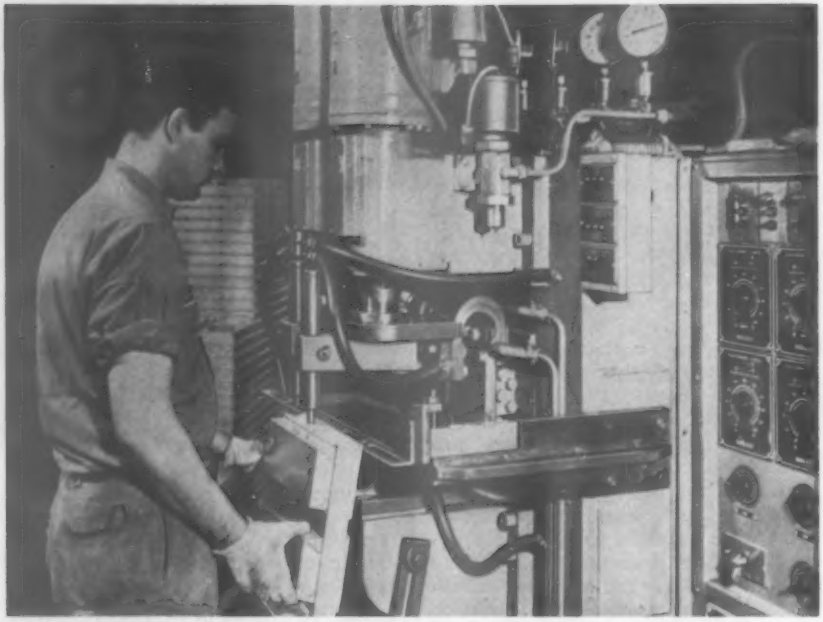
Optimum results are obtained by welding in downhand position, using direct current, reverse polarity. Care should be taken to keep the electrode dry before use. For work where a high radiographic standard is demanded, arc voltage should never be allowed to exceed 31 volts.

The new electrode has been approved by Lloyd's Register of Shipping for downhand welding and for deep penetration welds. The British Ministry of Transport has accepted it for downhand welding only. It also has been approved by the American Bureau of Shipping.

Typical welds made with coated electrode included fillet weld (left) and prepared butt weld (right) in ¾-inch mild steel plate.







Spot welding joins four pans to side bracket. Machine makes two welds at a time.

How Spot Welded Aluminum Makes

Use of spot welding with close quality control speeds production, produces stronger, cleaner pans for the baking industry . . .

THE experience of Lockwood Mfg. Co. in production of bread pans for the baking industry has proven once more that aluminum can be resistance welded quickly, and economically. Rejecting riveting, the company found that resistance welding not only cut costs and production time but yielded a durable, more sanitary product. This last is of great importance in production of items for the food processing industry, and was accomplished by elimination of many of the dirt catching raised surfaces that accompany riveting.

In the first step of fabrication,

Destructive testing and careful recording keep quality high. Note stacked pans.

Stronger, Cleaner Assemblies

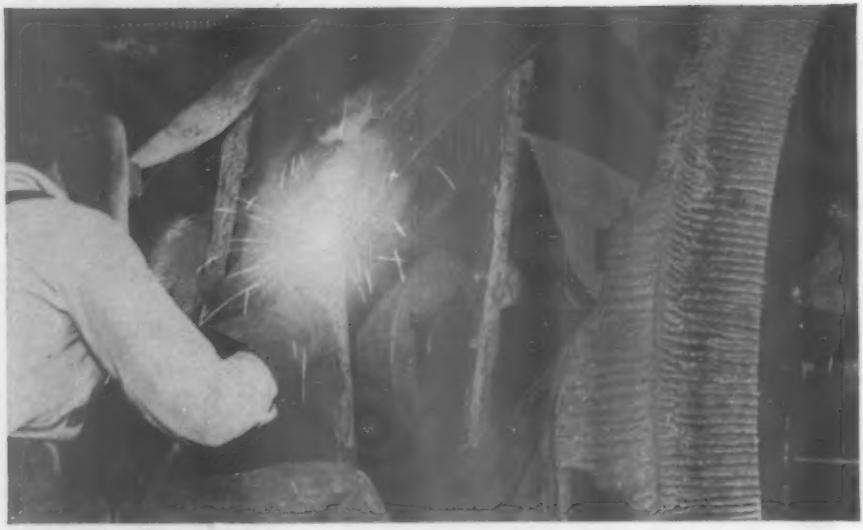
aluminum coil stock is cut to size and blanked to shape. Material for braces that join the pans is also taken from coil stock, rolled to width, cut to length and formed to shape.

After blanking, the aluminum is etched and cleaned. Blanks are etched to produce a surface resistance reading of 25 micro ohms. Experience has proven the holding life of the etch used at Lockwood to be very good. As long as ten days can elapse before the resistance (rating) changes noticeably. This good resistance reading prolongs electrode life.

In the next step the sides are formed, the laps squeezed tight, and edges formed for the wire rim. Wire is added, the edges turned down around the wire and the corners closed.

Formed of .032 or .040 material, the pans are joined in sets and separated by small stainless steel braces which are made on each side of the brace. Then two overlapping bands are welded around the edge of the pan sets at the top. Prior to welding, bands are in two halves. Aluminum used in these bands is .062—52SH34.

In joining bands to pans, the op-



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Your Amsco distributor has many helpful methods for selecting the proper hardfacing rod to most effectively combat types of wear you contact daily. *Make him your hardfacing headquarters.*

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THE AMSCO® HARDFACING LINE IS COMPLETE . . .

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erator joins one half-band around one side of the pan set. Two welds are made with each stroke of the welder. Electrodes are so spaced that two welds join each pan to the band.

The first half-band is joined only to the ends of each pan. After the ends of the pans are joined to the band, the half-band for the other side is joined in the same manner.

After both half-bands have been joined to the pans, the end of the set is joined to the band with two spot welds where the bands overlap. Thus the entire operation is completed.

Close Quality Control

At frequent intervals during each production run, destructive tests are made and results carefully recorded. A minimum of ¼" button size is maintained. A daily quality control log is maintained. Destruction tests are made at the 10th assembly, then 20th, 50th, 100th, 150th and every one hundredth assembly from there on through the entire production run. Diameter of the buttons are listed. With these control records, any trends that indicate variance in weld quality can be corrected. Reliability and long life of pans in use can be traced directly to control logs maintained during production.

Beyond the daily log, weekly reports are made. Electrical force is measured each week. Measurement and dial readings are checked to coincide. Water system of the welders is completely cleaned each week and refilled with de-ionized water. Careful quality control thus also helps minimize equipment maintenance because dangerous trends can be usually noted before damage is done.

Photos and data courtesy Sciaky Bros., Inc.

This job shop is small, neat and versatile. Note fan in rear window.

Welding Helps A Small Job Shop Custom-Build Exhaust Fans

Ingenuity is a daily requirement in thousands of job shops across the country. Here's a typical case history . . .

PEOPLE who run small job weld shops run into a myriad of problems that never arise in large production shops. Comparatively simple tasks require improvisation and ingenuity. For the job shop, limited in resources and equipment, welding is an indispensable tool.

Economy and simplicity have long been recognized as two of the principal advantages of welded construction. This was recently brought home in one small shop when an order came in for an exhaust fan. Requirements demanded that it be able to properly ventilate a small shop room (approximately 5000 cu. ft.), that it be easily installed, and that the motor be fixed in position outside the stream of exhaust air.

Using a 1/3 HP motor, a fan was developed that worked so successfully, five similar orders were placed upon completion of the first. Proper mounting and rigidity of welded construction combined to produce a fan that is surprisingly quiet, considering its size and speed. Coil springs were inserted between frame and mounting sur-

face. These were held in place by bolts passing through them. Consequent reduction of vibration and flutter minimized maintenance. Periodic cleaning and greasing are all that has been needed to insure continuous and satisfactory service.

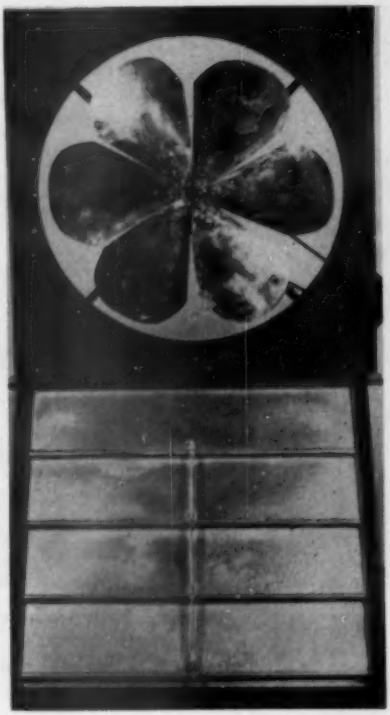
The entire mount and framework was welded in one piece, using ordinary mild steel electrodes. Shaft and bearing housing assembly were designed in such a way as to remain the same through a wide range of fan sizes, thus making it comparatively simple to modify dimensions of only the frame, mounting arms and fan blades to develop a unit, larger or smaller, that meets particular requirements. In addition, multiple speeds can be obtained by varying the ratio of motor and fan pulleys. Further speed control was provided

One of the most important factors in the construction of any fan is careful balancing of the blades. To test blades for balance, the motor was turned off. Blades were set spinning by a touch of the hand. Being able to stop the blade at any point in its course of travel and have it remain motionless is the indication that blades are of even weight.

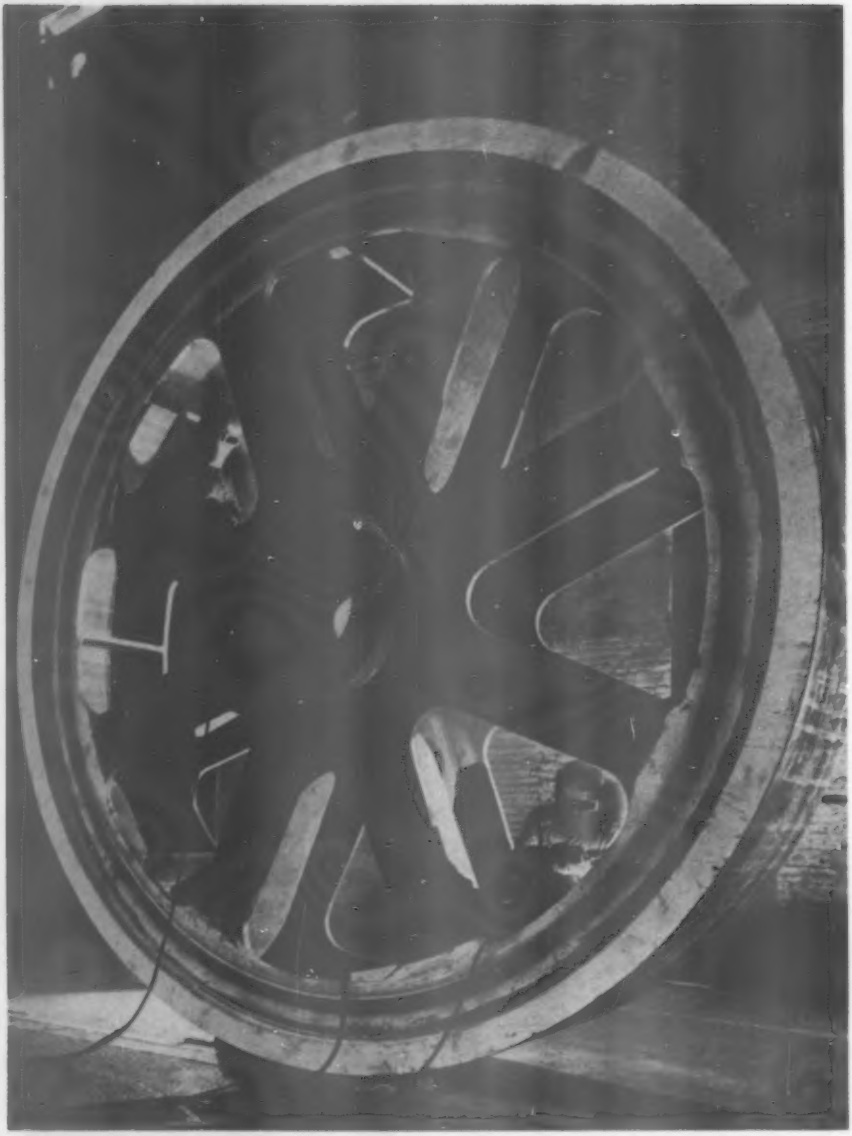
Blades Filed

Care must be taken in initial cutting and fitting. Even then, chances are that further adjustment will be necessary to achieve balance. This process of fine adjustment was carried out by filing metal from first one blade, then another, until near perfect balance was accomplished.

Since the fan exhausts direct to atmosphere, it was necessary to add a weatherproof shutter. Here again welding expedited the work. The steel angle frame shown in accompanying photographs was assembled by welding corners with ⅛" mild steel electrodes. The little lever arms that are attached to the aluminum fins were welded with $\frac{3}{32}$" aluminum electrodes. The shutter is of the simple gravity closing type, opening with the force of the exhaust. Since shutter fins are fabricated of No. 26 gauge aluminum, the low heat requirement of $\frac{3}{32}$" aluminum electrodes proved very helpful.



Arc welding was used to fabricate frames and shutter components. Fan, built to fit specific requirements, has motor set to one side.



World's largest all-welded sheave is completed at Bethlehem Steel Co. More than 275 pounds of weld metal was used to fill gap between web and rim. Automatic welding was done at 650-700 amps with $\frac{5}{64}$-inch diameter coiled wire electrode.

Welding stresses were minimized in fabrication of 1¾-inch thick plate by careful attention to preheat, weld and postheat temperatures. Here's how . . .

Controlled Temperatures Eliminate Stresses in All-Welded Sheaves

CAREFUL attention to preheating and postheating operations, as well as strict maintenance of temperatures during welding, eliminated stresses in huge all-welded sheaves which will support vertical lift spans of the New York City Bridge to Welfare Island. Weighing 37 tons apiece, four 15-foot diameter sheaves were fabricated of rolled plate and forgings at the Bethlehem, Pa., plant of Bethlehem Steel Co. Sheaves were described by the engineering firm which designed the 2,251-foot bridge as the largest all-welded type ever made.

Use 2500-Ton Forging Press

Nubs of the sheaves were forged on a 2500-ton forging press and center bored to an inside diameter of 22-inches at the Bethlehem plant. For the web section, two rolled plates 1¾-inches thick and more than 7-feet wide were welded together and cut-outs made. Stiffener ribs of plate of the same thickness were welded into the web to give it added strength.

The plates, as well as the rims of the sheaves, were rolled at Bethlehem's Sparrows Point, Md., plant. Rims are rolled plate 6-inches thick and about three feet wide. Following shipment to Bethlehem, rims were cold formed into semicircular shape and butt welded together to form a complete circle.

Then the web plates, with backup strips, were welded to the hub and the rim. Both hub and rim were preheated with gas burners to a minimum of 200 degrees and maintained at that temperature during welding to minimize cooling strains. About 275 pounds of weld metal was used to fill the gap between the web and the rim. Welding was done with $\frac{1}{4}$-inch diameter coiled wire electrode using 650-700 amps.

Build Special Pipe Burner

A pipe burner used to preheat the rim was made especially for the occasion. The burner comprises two semicircular pieces of 3-inch diameter pipe with two rows of holes for gas jets. The two halves of the burner were placed around the periphery of the rim and lighted.

After welding, the sheaves were heat treated to relieve any stress set up during welding. The sheaves were then moved to a machine shop for finish machining and cutting in of 12 cable grooves, each about 2½-inches wide, to hold counterweight cables.

"More damage than the 1906 earthquake!" That's how observers assessed the situation when a San Francisco motorist collided with this historic landmark.

Welding Saves a Piece of History

WHEN a motorist plowed smack into an ornate water fountain at the busy corner of Kearney and Market in San Francisco, it looked like the end of an eighty year old historical landmark. Not even the earthquake and fire of 1906 did as much damage to the elaborate cast iron structure.

City fathers, faced with a very expensive removal job, turned toward repair instead. The job went to the Acme Welding Co., a local firm. When William Sommers, a partner in the company came out to inspect the damage, he found one leg and the catch basin shattered beyond recognition.

From here on it took imagination, detective work and welding skill to save the day.

Because of heavy pedestrian and vehicular traffic, Sommers decided most of the job would have to be done at his shop. The eighty recovered pieces of cast iron were delivered to the shop in a barrel. Only a jig saw puzzle fan can appreciate how Sommers felt. And, as in solving such a puzzle, he de-

New years of service were added when skilled repairmen welded over eighty fragments back into place. San Francisco Art Commission cited work for excellence.

cided he needed a picture—in this case a pattern of completed sections.

Uses Plaster Mold

First Sommers made a plaster mold of an undamaged section of the fountain that corresponded to the broken section. The mold, made in several pieces, was taken to the shop and assembled.

Next the fragments of cast iron were placed in a furnace and preheated to a dull red color. Then began the job of assembling the puzzle and welding the pieces together in the shape of the plaster mold. When all the pieces were welded into place, parts that were still missing were cut from $\frac{1}{4}$" mild steel plate, fitted into the assembly, and welded. Intricate shapes like rosebuds and grape bunches were cast at a local foundry and then added.

Welding was done with an oxy-acetylene torch using gray cast iron welding rod for filler metal. When cool, the assembly was carefully examined, but no cracks were found. All welds were ground smooth.

Close Fit and Preheat

The section was then taken to the fountain and fitted. Some grinding had to be done at the abutting edges of the repaired section and the main body of the fountain to attain a good fit.

Before welding, areas adjacent to the joint were preheated with an oxy-acetylene torch to about 400-500° F., in order to slow up the rate of cooling. Then the actual field welding was done with $\frac{1}{8}$" steel electrodes designed for welding cast

Nick gets a couple of cool receptions

It was the start of that real hot spell we had last summer. I had to catch a train and Goldie was out front honking the horn to hurry me up. I was in the attic taking a last minute look for an old electric fan she had asked me to get down weeks ago.

I couldn't find the darn thing anywhere, so I had to talk fast all the way to the station to keep her from asking. It's not the easiest thing in the world to out-talk Goldie, so I was feeling pretty good when the train pulled in.

The boss wanted me to take a run up to a large plant that makes heat exchangers for air conditioners to see how they were making out since they switched to inert gas and "60" Monel Wire for welding copper-nickel tube sheets to some steel flanges.

When I walk into the air conditioned plant, I see they have a whole battery of inert gas metal-arc welding machines.

The shop foreman says right off, "Mind you, we were getting good results on this copper-nickel and steel joint, hand welding with your '130' Monel electrodes. But now with this spooled '60' Monel Wire in these new machines we're getting *sound welds, and in half the time.*"

Then he shows me some of the copper-nickel tube sheets joined to steel flanges on the end of these big heat exchangers. And we look at the welds. They use .062-inch "60" Wire with a 70 argon- 30 helium mixture and a 270 amp current.

You could practically *see* the good physical properties of the welds. And this foreman says, "That's even greater penetration than we were getting . . . despite the fact it's faster welding. Besides that, we use less metal, because there's less waste. Clean deposits, too, aren't they?"

They sure were. And with "60" Monel Wire they're also corrosion-

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resisting just like solid Monel®. That's important because the heat exchangers circulate corrosive brine.

I could see there wasn't much I was needed for around here, but I hated to leave that cool plant and get on the hot train.

On the way back, I got to thinking about Goldie and that fan. Sure enough. The reception I get is even *cooler* than when I walked into the air conditioned plant.

Goldie says right off, "I found the fan. The one you were going to get out. It's broken!"

I'd thought the answer out on the train back. "Toss it out, honey. Tomorrow we'll order an air conditioner."

Brother! Give me welding problems any day.

Got any yourself? Remember, if you want help on how to weld one kind of metal to another, just write me about it. And don't forget Inco has a complete line of welding materials to choose from. We also have a new edition for you of T-2, our bulletin on fusion welding.

Yours for better welds,

Nick Rodder

P.S. See you June 8th at the Welding Show in Kansas City! Inco's got *Booth 109*. Be sure to stop by. We've got something new to show you!

WELDING SHOW

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N.Y.

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iron. Completed welds were ground and polished.

The repaired section was painted with a primer and filler of red lead and zinc chromate to attain a smooth finish. A final coat of bronze type paint was applied. It takes sharp scrutiny to detect that the fountain has been repaired. Taking note of this, the San Francisco Art Commission accepted the work and thanked Mr. Sommers and Acme Welding Co. for a fine job accomplished.

The repaired fountain has an interesting history. It was presented to the city of San Francisco in September 1875 by Lotta Crabtree, a well known actress of the period. Originally, water flowed from the mouth of a Griffin's head into a basin. Tin drinking cups were attached to the fountain with chains. Since then, of course, sanitary plumbing has been installed.

With the help of modern welding practice, the gift of "the kind hearted little actress" will give further years of service to thirtsy San Franciscoans.

Price of Selenium Rectifiers Boosted

A price rise of five to ten percent has been announced by International Rectifier Corp., the nation's largest supplier of selenium components for rectifier type DC welding machines. According to the release, the increase was made necessary by recent rises in the price of copper, brass and aluminum. At the same time, the corporation announced the appointment of A. R. Hunter to its Application Engineering staff, and the selection of the Dale G. Weber Co., Portland, Oregon, as its industrial jobber in four northwestern states and Alaska.

Cuts down "DRAG"... cuts operator fatigue

NO MORE ENERGY WASTED on handling heavier, less flexible welding cables.

EXCLUSIVE! U. S. Royal Gold's unique yellow jacket of 60% natural rubber provides unbeatable visibility, reduces the hazard of accident which is present with black cable. Also, the yellow jacket provides an excellent contrasting color to black for conductor identification when two cables are required on welding machines.

COOLER TO HANDLE! The unusual *fluted* jacket provides greater surface area and thereby dissipates heat faster.

SUPERIOR IMPACT RESISTANCE! Proved by tests to be greater than that of conventional constructions.

LONGER LIFE! The greater flexibility of U. S. Royal Gold means greater dependability at terminal connections, minimum maintenance. Higher visibility of yellow jacket reduces danger of accidental damage, adds more life to cable.

GREATER MOISTURE RESISTANCE! That's because of the special 60% natural rubber insulation. Added protection is provided by the jacket, also of 60% natural rubber! Get U. S. Royal Gold at electrical supply houses.

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Resistance to oxidation, wear and corrosion plus good mechanical properties are offered by a new series of nickel-base brazing alloys. Here's the first half of an article on how . . .

VERSATILE NEW HIGH-NICKEL ALLOYS EXPAND BRAZING APPLICATIONS

by R. C. KOPITUK
and C. V. FOERSTER

A GROWING demand exists for brazing and coating materials which will have good mechanical properties, and offer high resistance to oxidation, wear and corrosion at low and high operating temperatures. To meet these needs a new series of nickel-base alloys have been developed. They overcome, to a large extent, the limitations of earlier high temperature brazing and coating materials which depended on rigid atmosphere controls for successful bonding.

Versatility of these alloys makes it possible to utilize modern continuous furnaces with exothermic gas generating equipment. It is now possible, with these alloys, to join sections whose sizes previously were impractical; to braze assemblies in large quantities; and to convert costly batch type operations to more efficient and economical continuous production techniques.

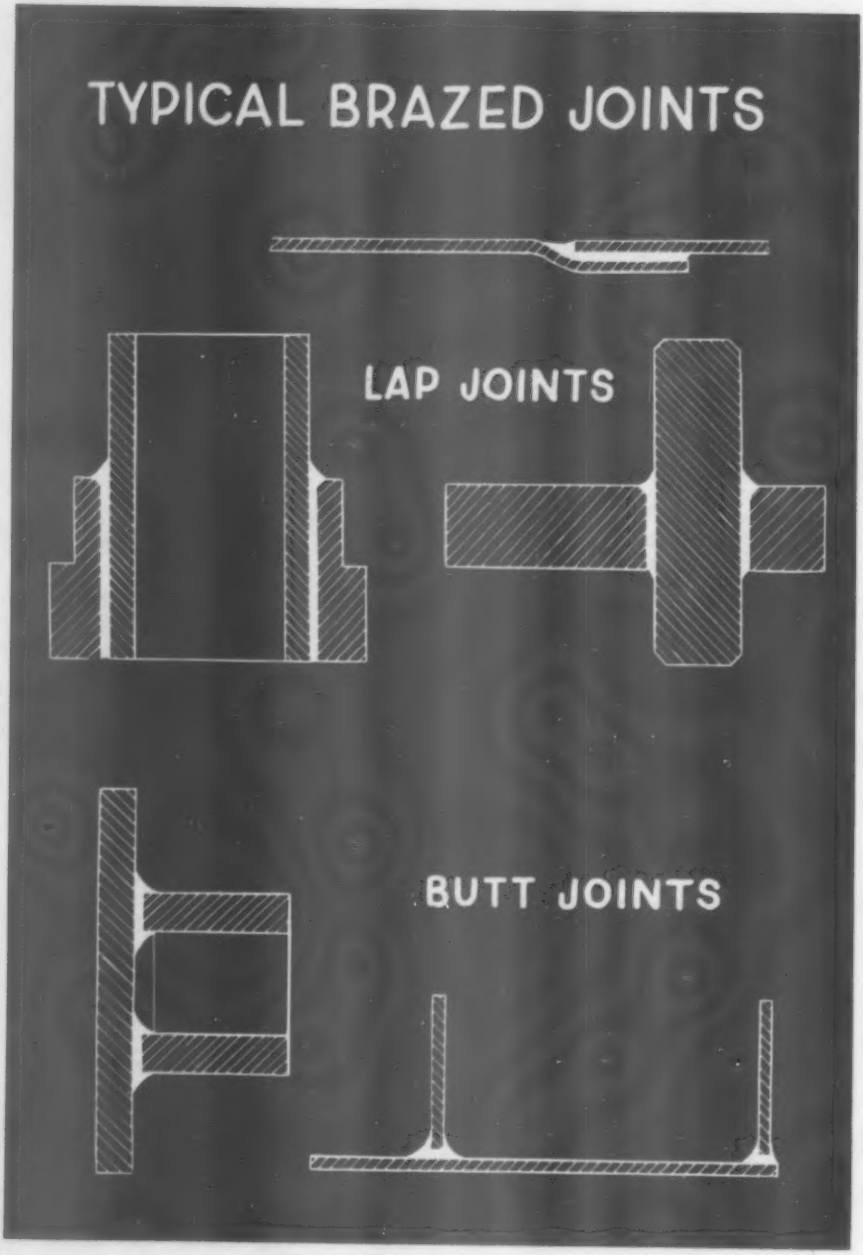
Description of New Alloys

Joints made with the new alloys differ in metallurgical characteristics from those made with copper, brasses, bronzes, solders and other popular brazing metals, in that they approach closely the mechanical properties, corrosion resistance and

NEW HIGH TEMPERATURE BRAZING ALLOYS

Alloy	Nominal Composition						Flow Point ° F.*	Hardness R.C. Before Brazing	Recommended For
	Ni	Si	B	Cr	Fe	Others			
A	93.25	3.50	2.25	-	-	1.00	1925	39 to 44	Wide or close clearance joints. Good pre-diffused strength. Thin walled sections.
B	91.25	4.50	3.25	-	-	1.00	1825	57 to 62	Good general brazing conditions. Must be held at temperature for high strength joints
C	82.10	4.50	2.90	7.00	3.00	.50	1825	57 to 62	Good general brazing conditions. Best alloy for use in air atmosphere
D	71.25	4.00	3.75	16.00	4.00	1.00	1880	57 to 62	Material conforms to AMS-4775

* In Dry Hydrogen


TYPICAL BRAZED JOINTS
LAP JOINTS
BUTT JOINTS

oxidation resistance of stainless and heat-resistant alloys, for whose fabrication they are largely intended.

Some of these new alloys possess great fluidity, while others are comparatively sluggish. Both types have a wide range of applications. Variations in flow characteristics of the several alloys are necessary to meet different conditions existing during the brazing cycle and to produce the end results desired.

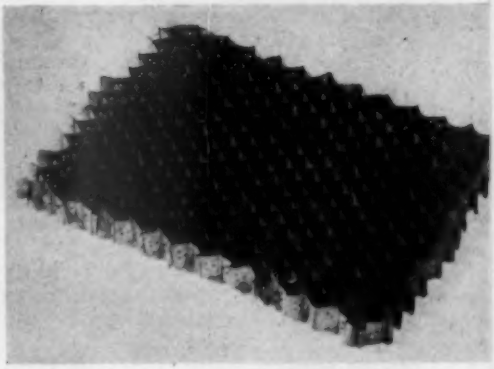
Different Alloys Yield Same Results

Accompanying table provides a general description of the alloys. It is to be noted that while the chemical composition of Alloys A and B are very similar, considerable difference exists in their physical characteristics before brazing. These are designed to produce similar end results in brazed joints made under different conditions.

During the brazing and alloying process, hardness of the brazing materials drops and a corresponding increase in melting point and ductility occurs. By holding the assembly at brazing temperature, it is possible to produce an essentially homogenous, uniform structure, with a sufficiently high melting temperature in the joined area to permit successive brazing without disturbing the initial joint. As a result of this alloying and consequent increase in melting point, once a joint is brazed, it must be heated above its original temperature and close to the melting temperature of the joined parts before they can be separated.

Metals Which Can Be Brazed

Most metals with melting temperatures higher than 1850° F. can be brazed with one of these new alloys. Modifications of brazing techniques are employed when the alloys being brazed contain elements which form refractory oxides.



Formerly difficult to braze, precipitation-hardening stainless steel alloys can be used in this intricate honeycomb section without trouble if special heat treatments, singular to those alloys, are observed.

Alloys such as the austenitic types of stainless (300 series, particularly 321 and 347), nichrome, inconel and others high in nickel content offer few problems.

The precipitation-hardening alloys, such as Armco 17-7PH, which have been considered difficult to braze in the past, are now relatively easy to join if special heat treatments, singular to these alloys, are observed.

Design of Joints

Heat-treatable steels soften at brazing temperature and present individual problems in re-hardening. However, in some instances, brazing and hardening can be accomplished in a single furnace cycle.

Generally, the new high nickel brazing alloys will perform satisfactorily when used with the same principles of design which have been successful with copper, silver and low-temperature materials. The

ideal joint is one which permits free movement of the brazing alloy, without interference from the surfaces of the parts or gases accumulated during the brazing process.

Alloying With Parent Metal

However, an additional factor to be considered is the desired degree of alloying with the parent metal. Both the degree and the effect of this alloying will vary, depending on the geometry of the joint and the chemical properties of the parts being joined.

In general, factors pertinent to this alloying can be summarized as follows:

The depth or amount of alloying secured in any given joint is determined by three conditions: (1.) the quantity of brazing alloy used, (2.) temperature and (3.) time the assembly is held at brazing temperature.

Temperatures well above the liquidus will accelerate the alloying process considerably. Also, alloying will continue while the assembly is kept at brazing temperature.

In brazing thin sections, a minimum of alloying is usually desired, since alloying with the brazing material will affect properties of the parent materials. The distance brazing alloy will flow is governed to a great extent by rate of alloying. Location of the alloy is important. On heavy sections which heat irregularly or where heating rates are slow, as in batch type furnaces, the brazing alloy must be placed as near the joint as possible. If the flow point is attained before proper temperature is secured in the joint, an incomplete braze will result.

Preparation of Base Metals

Only clean surfaces will braze satisfactorily. Grease, dirt, oxides, atmospheric dust, abrasive residues, corrosion products—in fact, any foreign matter may interfere with the flow and bonding of the alloys.

While most cleaning methods are acceptable, sand blasting is not recommended because silica will interfere with the flow of brazing alloy. Grit blasting is satisfactory when clean grit is used. With any abrasive method of cleaning, it is a good practice to wipe joint sur-

(Continued on Page 114)

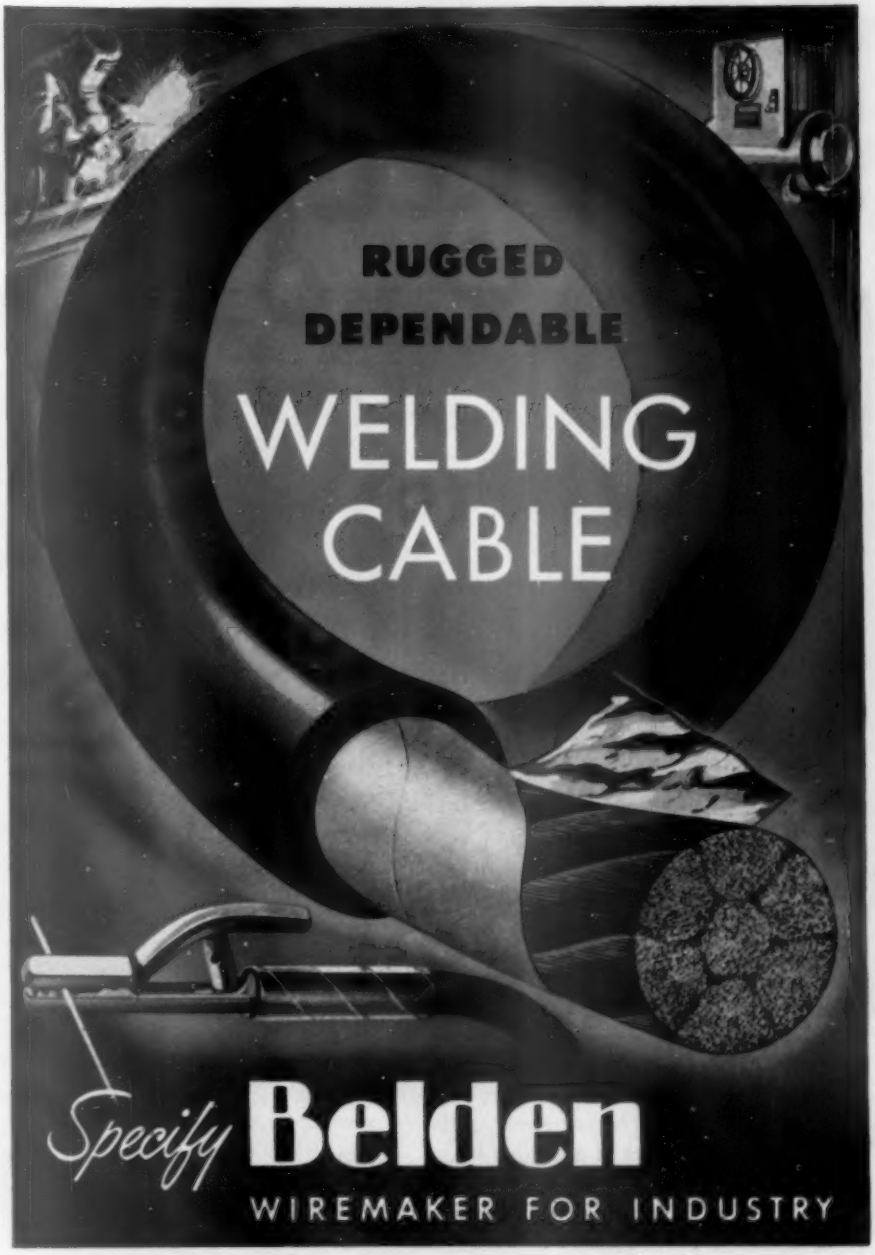
ABOUT THE AUTHORS

R. C. Kopituk

C. V. Foerster

Mr. Kopituk is metallurgist at Reaction Motors, Inc., which furnished illustrations and research facilities for the preparation of this article. A graduate of Notre Dame with a B.S. degree in Metallurgy, Mr. Kopituk did research work for Crucible Steel Co. and was in charge of production control for Norwalk Razor & Blade Co.

Mr. Foerster is research director at Coast Metals, Inc. He graduated from Penn State with a B.S. degree in chemistry. He did metallurgical research work with U.S. Steel before joining Coast Metals.



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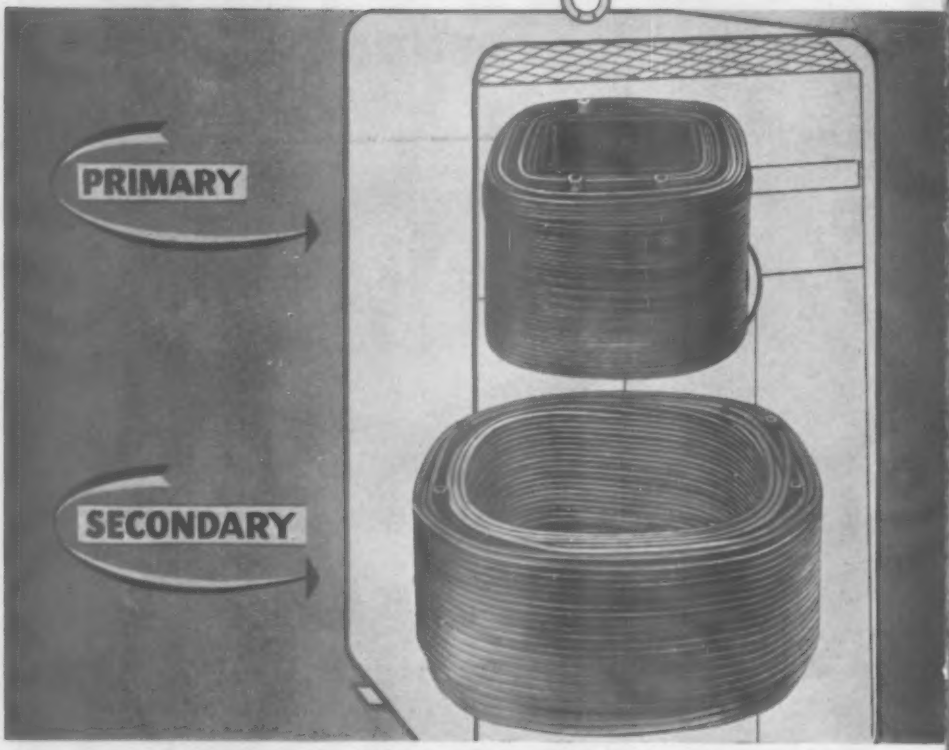
More copper



WHEN you buy a welder, find out for sure how much copper is in the transformer coils. That's the heart of a welder's performance.

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75 open circuit volts

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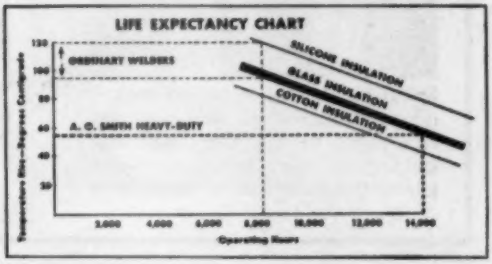

Chart shows how generous use of expensive copper combines with job-proved coil design to promote cooler operation.

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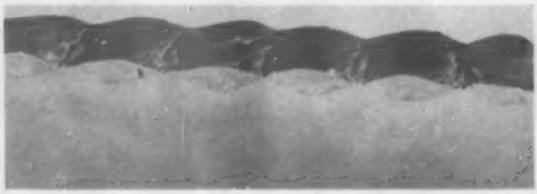
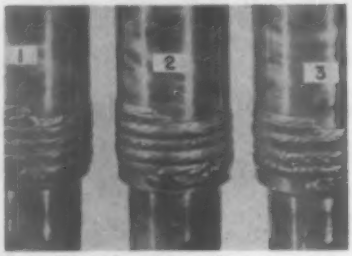
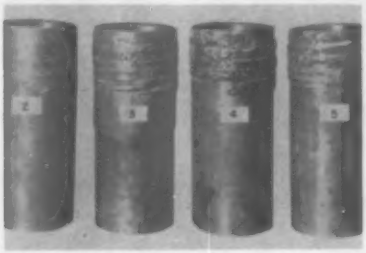
THESE ARE TYPICAL AUTOMATIC WELDS . . .

Hardfaced by welding of tungsten carbide in machined grooves, shrink thread tool joint section shows good fusion, uniform contours and shallow heat-affected zone.





Spiral bands of hardfacing material were applied to shrink thread tool joints by portable automatic welding in the field. Machined joints simulated worn conditions.



These shrink thread tool joints were hardfaced by automatic method. No. 2 shows most wear, No. 4 shows burn-through near shoulder. No. 5 failed completely.

AUTOMATIC HARDFACING IN THE FIELD

MAJOR problems of drill pipe users in recent years have been overcome by improvements in design, use of better materials and hardfacing tool joints. Hardfacing became an established field practice because of its ability to extend the life of worn tool joints. It has proven effective and economical when done properly.

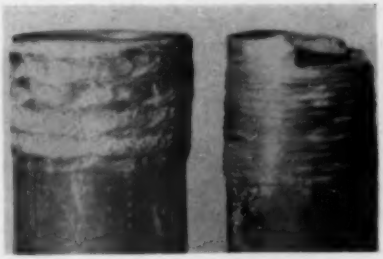
As a leading manufacturer of drill pipe and tool joints (including hardfaced Spangweld integral tool joints) in its Spang-Chalfant plant in Ambridge, Pa., and Toledo, Ohio, plant, The National Supply Company has joined industry in an attempt to remove all possible limitations on the life of drill pipe and tool joints. Investigations have shown that the success of hardfacing depends upon many factors which could be better controlled. The results of hardfacing, as now practiced in the field, vary widely in the degree to which they make tool joints last longer.

The reason for poor results is

by C. SWARTSFAGER
Engineering Department
National Supply Company, Toledo

. . . AND THESE ARE NOT SO TYPICAL

Failure of this tool joint resulted from a loose connection and wobbling action in drilling service. Welding heat caused shrink stresses to relax. Hardsurfacing material prevented joint from returning to its original tightness.



Pin failure in integral-type joints resulted from effect of prolonged heat while hardfacing entire length of the tool joint.

SPEEDS OIL WELL MAINTENANCE WORK

usually excessive heat which penetrates and weakens parent metal. No subsequent heat treatment can be applied in the field to correct the detrimental effects of this heat penetration. Heat penetration depends upon the speed of application, skill of the welding operator and method of hardfacing used. Sufficient thickness of the worn walls of tool joints is the most important factor in their successful hardfacing.

In contrast to field practice, the machine method of applying hardfacing materials during manufacture of new tool joints, as done in our Toledo plant, provides closer controls than are possible in the field, especially with manual methods. Since this is true, and since there are many pitfalls, such as too rapid cooling, in the field application of hardfacing, regardless of the method employed, recommendations that are given here are offered without assuming any responsibility for results. They are, nevertheless, steps in the right direction.

Portable automatic welding machines, such as those used in the

"automatic welding minimizes excessive heat input"

Toledo, O., plant of National, appear to be best for field hardfacing and are gaining favor over the two common manual methods: acetylene welding and electric arc welding. Advantages are ease of closer control, faster and more uniform application of hardfacing materials, and ability to apply heavy deposits with minimum heat penetration.

Two types of tool joints, the shrink thread and the integral type, present slightly different problems with respect to hardfacing. The inducement is greater and the risks often less with integral type tool joints because they cannot be readily replaced in the field and they have a thicker wall without pipe threads underneath.

Facts on Manual Hardfacing

The manual oxy-acetylene method of hardfacing is not recommend-

Manual arc welding of hardfacing material over integral-type pin was used to build up entire length of this integral-type tool joint.

ed for the heat-treated shrink thread tool joint because its excessive heat penetrates parent metal with detrimental effects. Further heat treatment after field hardfacing, though essential after such application of hardfacing material, is impossible for the already shrunk-on type of tool joint.

The results of a laboratory examination of a section of tool joint to determine depth of heat penetration and hardness reduction in the heat-affected zone show changes in physical properties of the parent metal cause relief of shrink stresses, thus loosening the connection so that failure occurred.

The manual electric arc is much faster than oxy-acetylene and should induce less heat into the joint. However, the time element still plays a major role, especially if a thick deposit is required. The result is then practically the same as that produced by acetylene welding with deep heat penetration and reduction of hardness in the parent metal. Again, relief of shrink stresses bring ultimate failure.

Since the hardfacing metal (tungsten carbide) expands and contracts negligibly with temperature variations, many cracks develop in the deposit if it is permitted to cool too rapidly. These cracks may extend through the wall of the joint, thus relieving the shrink interference and causing failure. The manual electric arc method also, therefore, is not recommended.

Develop Automatic Machines

Various automatic welding machines have been devised for the continuous application of hardfacing metals in factories. Machines incorporating the electric arc method are more commonly used than other types. All factors are under absolute control to produce the best possible deposit. The result is

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of a DC welder

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a uniform contour and fusion of each bead with minimum heat penetration.

Shallow heat lines indicate that it is practical to deposit hardfacing metal on heat treated tool joints with these machines without jeopardizing physical properties of joints having a reasonable wall thickness. Precautions in hardfacing operations in the shop include preheating to prevent the development of cracks in the deposits and post heating to relieve any stresses caused by welding.

Test Automatic Hardfacing

Soon after portable automatic hardfacing machines came to the attention of The National Supply Company, shrink thread tool joints were installed on drill pipe and each hardfaced experimentally in the field.

To simulate worn conditions, the tool joints (4½-in. full hole double seal) were machined to wall thicknesses of 0.365 in., 0.428 in., and 0.553 in. After preheating each tool joint to about 400 deg. F., chrome-tungsten wire with 50-52 Rockwell "C" was applied as a base metal layer under a submerged arc to form four helical grooves. Then tungsten carbide of 20/30 mesh in coil form, was deposited in these grooves to form four spiral bands. No stress relief was used in the field after hardfacing.

Hydrostatic tests of these joints to 5000 PSI showed no leaks through the seals. Torque tests at 80 percent (15,610 ft. lb.) of the torsional yield in the make-up direction, which is considered satisfactory without destruction to the pipe body, did not

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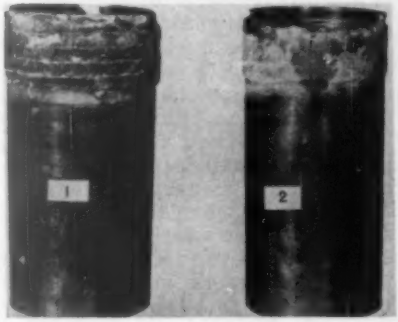
move the tool joints. Furthermore no movement was apparent when test loads were increased to the maximum at which the drill pipe was crushed out of round by chuck jaws. These loads averaged 33,000 ft. lb.

Inspection for cracks with oil and fluorescent powder methods revealed numerous longitudinal



Failure of two internal flush tool joints after being hardfaced by automatic welding is shown here. Crazed condition of deposit in joint No. 1 was made visible by inspection. This cracking was partly responsible for splitting shown in joint No. 2.

cracks across all beads of tungsten carbide and transverse cracks in the chrome-tungsten base metal. These cracks indicated the possibility that preheat temperature may have been insufficient and cooling in air too rapid for these two materials.

To avoid possibility of altering the new physical properties of the metal in the heat-affected zone directly under the hardfacing deposit, the hardfaced boxes were recovered from the drill pipe by machining the pipe dutchman out of each box.

Etched crosss-sections from each tool joint revealed that the heat line was not excessive, although two layers had been applied, and

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that carbides had the usual distribution. Rockwell "C" readings in the heat-affected area indicated a slight reduction in hardness. Heat penetration in the joint with 0.365-in. wall approached the danger point. Consequently it is recommended that walls thinner than this be considered too risky for successful hardfacing.

Use Care In Welding

When excessively worn tool joints are hardfaced by the portable automatic welder in the field, failures occur. Similar failures have also resulted from field applications of hardfacing to shrunk-on tool joints having relatively thicker walls when there is excessive heat penetration. This can occur as the result of variation in welding technique and should not be construed as a condemnation of the method itself.

Thread wear and the galled surface of the inner seal indicated creeping on the drill pipe during service. Consensus was that the intense heat of hardfacing on this thin walled joint penetrated the threads and relaxed shrink stresses enough to loosen the connection.

Results of tests of hardfaced tool joints indicated that limits should be established before hardfacing, particularly on the wall thickness in the thinnest section of a tool joint, and on the eccentricity of wear.

Welding Integral Type Tool Joints

Integral type tool joints present a greater inducement for field application of hardfacing than other types. Risks that result from field hardfacing practices have been accepted by users and apparently few failures have occurred in spite of the impossibility of subsequent heat treatment in the field.

Application of hardfacing metals by portable automatic welding ma-

chines to this type tool joint is being used extensively in both domestic and foreign fields. This method of application results in maximum overall economy and best control of heat penetration. Failures of manually applied hardfacing metals warn of the risks taken. The automatic method makes possible heavy deposits of hardfacing materials with minimum heat penetration and permits faster completion of hardfacing jobs. The risks of failure are less on these joints because of their thicker wall and absence of pipe threads underneath.

In general practice, hardfacing is applied over a three to four-inch area adjacent to the 18-deg. elevator shoulder of the tool joint. Sometimes a string of flashweld drill pipe is conveyed to a field machine shop where grooves are machined in the tool joints and filled with tungsten carbide by the manual oxy-acetylene welding. Although heat penetration by this method was excessive, the thick section under the hardfaced deposit was ample to absorb the heat. There was, however, a reduction of hardness in the heat affected zone.

Full Length Build-Up

In some instances entire length of the tool joint has been built up with weld metal. Both the slow manual oxy-acetylene method and the faster manual electric-arc method were used. These full length build-up methods result in more failures because the prolonged welding heat is high enough to change physical properties of the tool joint steel.

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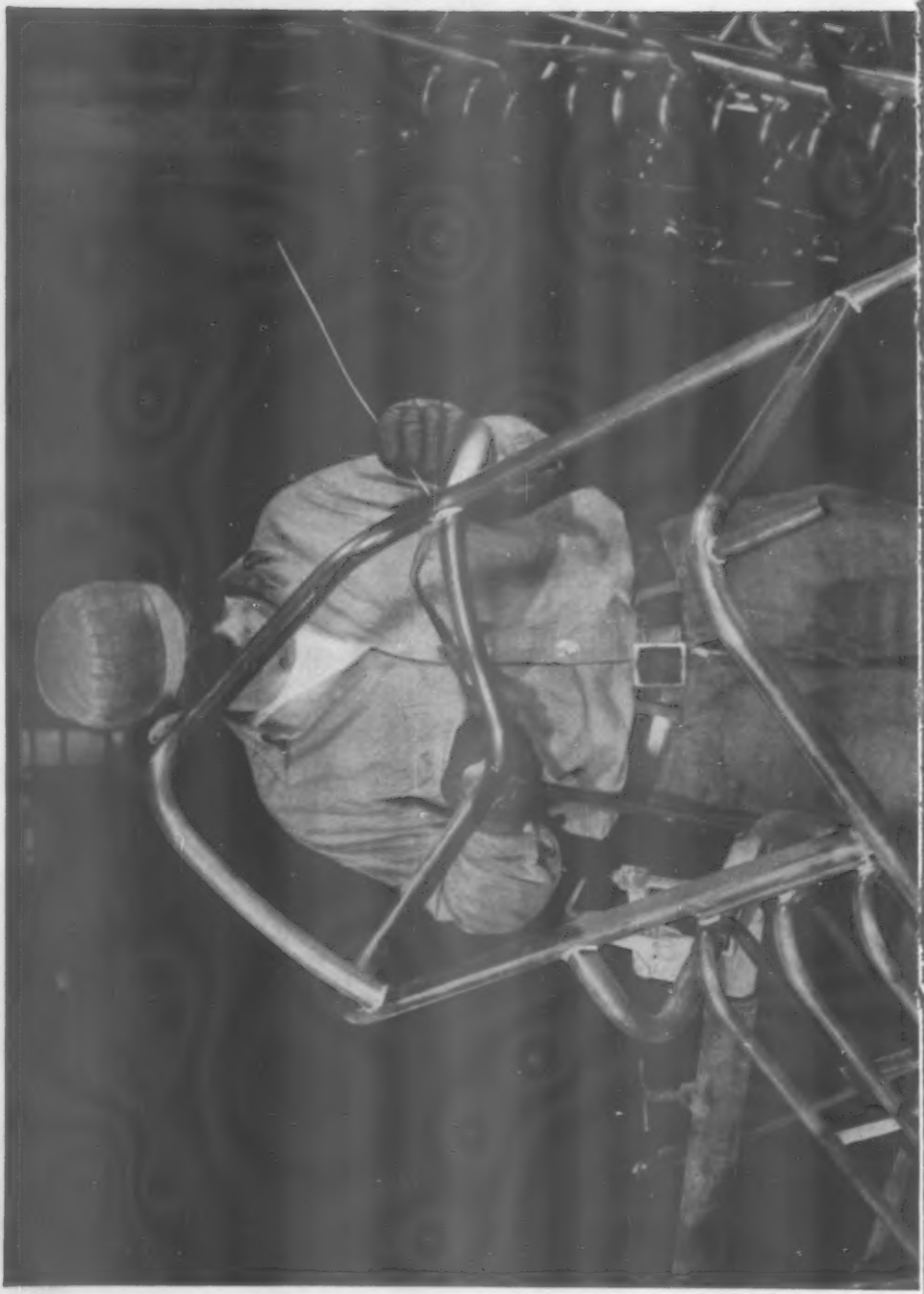

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A revolving fixture holds this tubular steel chair-desk while the weldor brazes the joints with ANACONDA-997 (Low Fuming) Bronze Welding Rod. Heywood-Wakefield Company began producing welded steel tubing back in 1910. Today, they are leading manufacturers of tubular steel schoolroom furniture, bus, subway, railway car and theater seating.

here's production speed . . .

23 braze welds in 17 minutes

Here's the finished chair with seat, back rest and desk sections in place.

They know a lot about the techniques of production welding at Heywood-Wakefield Company, Gardner, Mass. Take the combination school chair-desk you see here. First it's tack-welded by semi-automatic resistance welding. Then it goes into a revolving fixture for braze welding with ANACONDA-997 (Low Fuming) Bronze Welding Rod and the flame-fluxed oxyacetylene process. The weldor swings the assembly to reach all joints from one position, completing the 23 welds in an average time of 17 minutes.

It's not only a fast job . . . it's a *good* job. The credit goes to Heywood-Wakefield engineers for their time-saving fixtures; to the weldor for his skill, and to the ANACONDA-997 rods he uses. Heywood-Wakefield prefers these rods because the finished welds are very strong, and they don't require special cleaning before painting. They're degreased, wire brushed . . . then painted. That's all.

ANACONDA-997 (Low Fuming) Bronze is a superior welding rod used to join copper alloys, cast iron, malleable iron and steel by the oxyacetylene process. It is also used for repair welding, and to deposit bearing surfaces on steel and iron. You can get other ANACONDA Copper Alloy Welding Rods for many different repair and production welding purposes. They're sold by distributors of welding equipment everywhere. Anaconda distributors are also a good source of practical advice on welding problems. Pratt & Inman Company, Worcester, Mass., general distributors, furnish Heywood-Wakefield Company with ANACONDA-997 Welding Rods. For more information about ANACONDA Welding Rods and recommended welding procedures, write for a copy of Publication B-13. Address *The American Brass Company, Waterbury 20, Conn.* In Canada: *Anaconda American Brass Ltd., New Toronto, Ontario.* 5112B

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FUSION WELDING TITANIUM

(Continued from Page 43)

light. The end plates were consequently cut off and replaced with heavier material. The duct was then retested. This test was carried out in steps, at 50 psi per step. When a pressure of 600 psi was reached, the duct failed across the weld on one of the mitred joints.

A third test involved a section of rectangular duct designed to operate at pressures of approximately 100 psi. The material for this duct was .025 gauge, RC70 titanium sheet. The filler material was RC55. This ducting was made by first forming each individual channel and then assembling.

Aluminum Backup Bars

Manual welding was used, with argon as the shielding gas through the torch. For back-up, aluminum bars were machined to fit inside each channel. A ½ inch hole was drilled longitudinally through the bars, with small holes of approximately .050 diameter, drilled diagonally from one corner of the bar to the ½ inch longitudinal hole. Helium was introduced into the hole and distributed to the back side of the weld joint through the small holes in the bars. These aluminum bars served two purposes in welding the duct: first, as an alignment for the channels; and secondly, as a combination back-up of metal and of helium gas for the weld joint.

After welding longitudinally, the section was cut to make a mitred joint, approximately in the center of the duct. For protection against contamination during welding of the mitred joint, plates were tacked on the ends of the assembly. Helium was then introduced at a flow rate great enough to assure adequate protection inside the duct.

When the duct had been completely welded and checked for leaks, it was pressure tested. The weld itself failed, but only under pressures nearly four times as great as those to be expected under normal operating conditions.

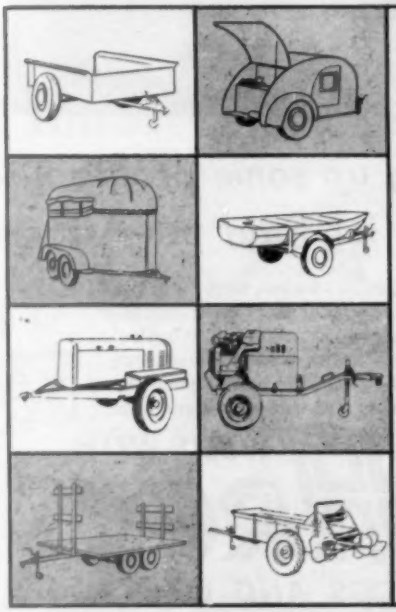
Can Be Welded

From these examples, it will be apparent that the fusion welding of titanium can be successfully accomplished with standard equipment, both inside a chamber filled with helium — and outside, in a normal atmosphere. Results of the tests have exceeded the requirements originally set up for the design of these assemblies. Physical tests indicate that it is feasible to obtain the strength of the parent material in the welded joint.

Tooling is an important factor in the successful welding of titanium. Jigs and fixtures should be designed, where possible, to serve as a combination holding fixture in which to assemble the parts—and as a back-up for the weld joints. Design of the back-up feature is critical—since it is necessary to provide good protection to the back of the weld joint.

Carborundum Acquires Curtis Machine

The Carborundum Co. has announced acquisition of Curtis Machine Corp. Gene DeMambro, president and general manager of Curtis will remain in that position, reporting directly to W. H. Wendel, vice president in charge of Carborundum's Coated Abrasive's Division.



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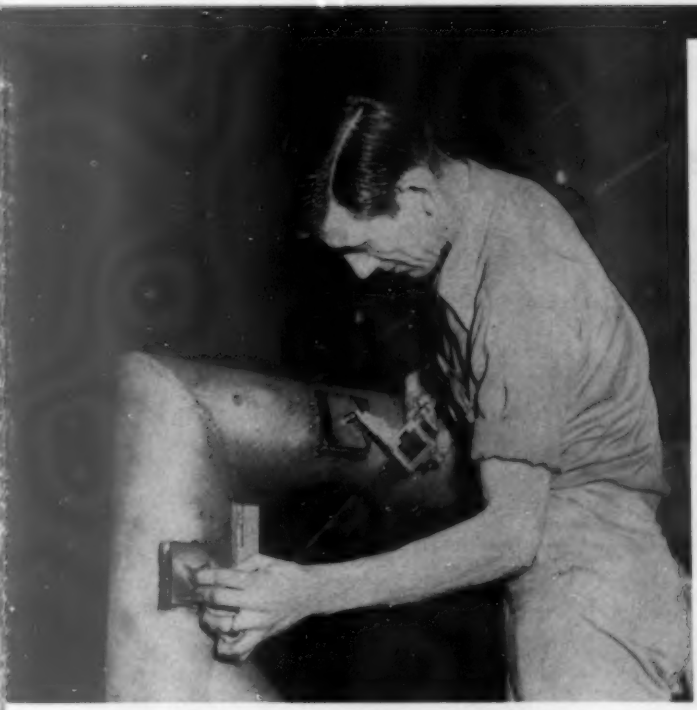


Inspectors at Chance - Vought Aircraft checked dimensions of huge test jigs—come up with surprising findings.

Welded Jigs Retain Tolerances Without Stress Relieving

By **DAVID S. GEROULD**
Tooling Research Engineer
Chance-Vought Aircraft, Inc.

TESTS of the value of stress relief before or after fabrication of welded jigs at Chance Vought Aircraft have revealed that the practice is of no value in retaining dimensional stability of the structures.

Research over a period of several months on two different types of welded pipe structures showed the company could save time and money by using jigs as welded. No evaluation was made as to comparative strength.

Chance Vought had been stress relieving all of its large welded jigs and fixtures to give them dimensional stability. It often was necessary to ship the structures as far as Houston from the Dallas plant to be stress relieved, since some of the structures were too large for furnace facilities in the latter area. This has all been eliminated. Large welded jigs and fixtures are now being put in service in as welded condition.

Tests Conducted

During the first phase of testing, five sets of fixtures were made and subjected to different pre-weld and

post-weld heat treatment, such as 600° F pre-heat, 1300° F furnace stress relief, 575° F furnace stress relief 16 hours and local torch stress relief. Test fixtures were stored and measured each month for six months. The as welded test fixture proved to be more stable dimensionally than the others.

To verify these results, three additional fixtures were built. One was furnace stress relieved at 1200° F, one pre-heated to 600° F and the other retained in as welded condition. These test fixtures were likewise stored and measured each month for six months. Once again the as welded structure proved more stable dimensionally than the others.

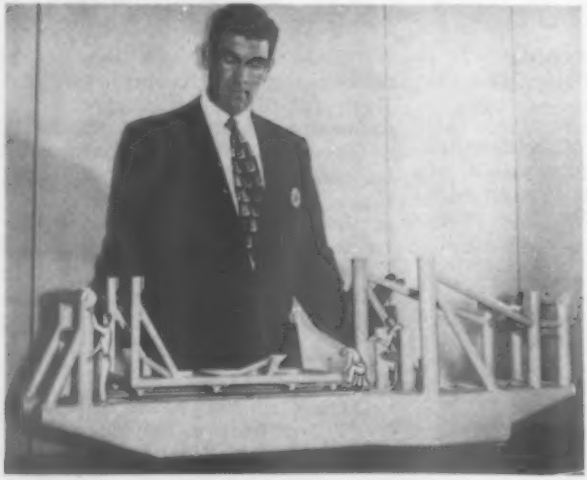
Retest Every 30 Days

In the final phase of testing, two picture frame type fixtures were made. One was stress relieved prior to machining, the other machined in as welded condition. The fixtures once more were stored for six months and measured every thirty days. Again the as welded structure proved to be at least as stable as the others.

No attempt was made to evaluate stress relief as related to strength of welded structures, since Chance Vought's large jigs and fixtures are never subjected to loads near their capacity.

Scale Models

An interesting sidelight on jig production at Chance Vought is the fact that prior to building the huge frameworks which support aircraft sections, tiny scale model jigs are built. These help engineers determine the practicality of the proposed fixture and thus save many man hours of rebuilding on the finished jig. Scaled down to exact proportions, the models include tiny figures of men and work tables. These are made to see whether the workpiece in the jig will be easily accessible.



Scale models of huge welded jigs are prepared before actual jig is built. Note accurately scaled mannikins.

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Literature Featured In Ads This Month

2 **Simplified automatic welding** with constant voltage welder is described. HOBART BROS. CO. Page 1.

3 **Portable industrial X-Ray unit** rated at 200 KV is featured. BALTEAU ELECTRIC CORP. Page 2.

5 **Complete welding electrode chart,** 24 x 36-inches, list complete line of electrodes, how to use them and gives suggested applications. WESTINGHOUSE ELECTRIC CORP. Page 4.

6 **Head and eye safety equipment** is listed in new catalog. DOCKSON CORP. Page 6.

7 **Brand-new welding torches** described in brochure are said to be lighter, stronger and cooler. MARQUETTE MFG. CO. Page 7.

8 **Reinforced resinoid disc-type grinding wheels** are available for free demonstration. BAY STATE ABRASIVE PRODUCTS CO. Pages 8-9.

9 **Preformed brazing ring and alloys** of every description are featured in catalog. ALLOY RING SERVICE, INC. Page 10.

10 **Positioning equipment for automatic welding** is subject of literature. ARONSON MACHINE CO. Page 11.

11 **Resistance welding products** for every application are described in complete new catalog. P. R. MALLORY & CO., INC. Page 13.

12 **"1954 Welding Data File"** tells how low temperature welding alloys clear up welding headaches. EUTECTIC WELDING ALLOYS CORP. Page 14.

13 **"Hot Rolled Carbon Steel Structural Shapes"** is the title of a complete, 71-page book containing dimensions, weights and properties of structural steel shapes and plates. U. S. STEEL SUPPLY DIV., Page 15.

14 **Combination safety cap-helmet** is introduced in latest bulletin. WILLSON PRODUCTS, INC. Page 16.

16 **How brazing simplifies metal joining** is explained in Bulletin 20. HANDY & HARMAN. Page 18.

17 **World's most versatile welding fixture** is how a portable, fully adjustable automatic fixture is described. LEWIS WELDING & ENGRG. CORP. Page 19.

18 **Illustrated bulletin on carbide brazing** gives step-by-step instructions on joining hard carbide inserts to all types of cutting tools. AMERICAN PLATINUM WORKS. Page 21.

19 **Industrial arc welders** for every possible use are featured. TRINDL PRODUCTS, LTD. Page 22.

21 **Practical aid in selecting right wheels** for weld grinding and finishing is contained in literature. MORTON COMPANY. Pages 24-25.

22 **Three types of tungsten electrodes** for inert arc welding are featured in technical data. SYLVANIA ELECTRIC PRODUCTS, INC. Page 26.

23 **Durable, leak-proof welding helmets** are among the welding safety equipment featured in complete catalog. CHICAGO EYE SHIELD CO. Page 27.

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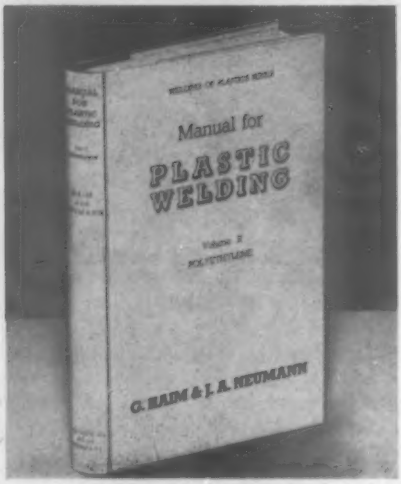

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24 **Complete line of arc welding accessories,** including holders and welded connectors, is featured in catalog. ERICO PRODUCTS, INC. Page 29.

25 **Advantages of positioned welding** are explained in Bulletin WP26. CULLEN-FRIESTEDT CO. Page 30.

27 **Why and how hardfacing should be applied** is contained in new catalog. RANKIN MFG. CO. Page 32.

28 **Everything for resistance welding,** including electrodes, holders, castings and forgings, is included in new catalog. WW ALLOYS, INC. Page 33.

29 **New single stage regulators** are introduced in 24-page catalog. K-G EQUIPMENT CO., INC. Page 34.

31 **Welding wire for all automatic operations** is featured in literature. PAGE STEEL & WIRE DIV., Page 36.

32 **Two new brazing alloys** for all copper and brass joining applications are featured in new, special folder. UNITED WIRE & SUPPLY CORP. Page 37.

33 **Seven welders in one** is how a new, versatile AC/DC welder is described. HARNISCHFEGER CORP. Pages 38-39.

34 **Complete hardfacing catalog** gives analyses, metallurgical information and pertinent data on complete hardfacing line, including 15 hardfacing rods. AMERICAN MANGANESE STEEL DIV., Pages 48-49.

35 **Complete line of welding materials** is featured in Bulletin T-2. INTERNATIONAL NICKEL CO., INC. Pages 56-57.

36 **How new lightweight welding cable cuts down "drag"** and operator fatigue is explained in free folder which describes fluted cable. U. S. RUBBER CO. Page 58.

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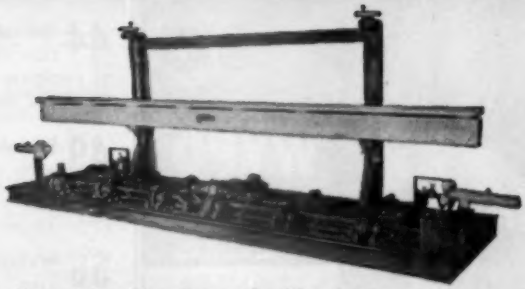

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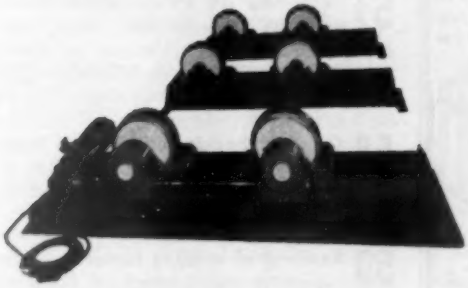

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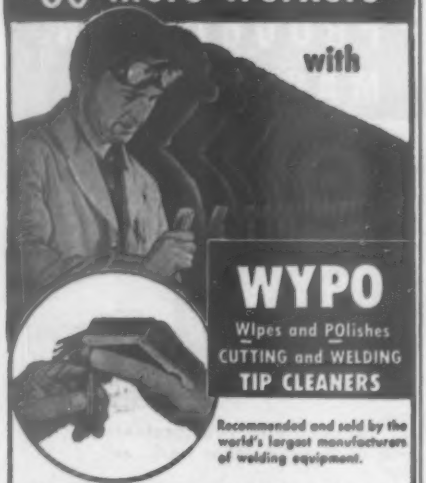

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The exclusive circle design found only in Wypo Cutting and Welding Tip Cleaners provides as many as 60 more cleaning edges per inch of cleaner.

Straight sided valleys, another outstanding feature of Wypo Tip Cleaners, insures a thorough cleaning and removal of all waste.

DOUBLE THE LIFE OF YOUR WELDING AND CUTTING TIPS

Fast, easy cleaning without jamming, scratching or enlarging the tip port means added years of service to your welding and cutting tips. Only with Wypo Tip cleaners do you get thorough cleaning and polishing with one quick easy motion.

STANDARD SET OF 12 Cleans 27 Drill Sizes. Nos. 75 to 49 Incl.

JUMBO SET OF 9 Cleans 19 Drill Sizes. Nos. 48 to 30 Incl.

WYPO TIP CLEANERS ARE AVAILABLE AT ALL WELDING SUPPLY JOBBERS

U.S. Patent No. 2,429,581 In Canada 1948

MAITLEN AND BENSON, INC.

1395 Obispo St. Long Beach 4, Calif.

Circle No. 52 on Reader Service Card.

39 **Combination AC/DC welder** is featured in Bulletin 1343. LINCOLN ELECTRIC CO. Page 69.

41 **Complete application instructions** are given for versatile nickel-silver brazing rod. ALL-STATE WELDING ALLOYS CO., INC. Page 71.

44 **Bronze welding rod** and how they can be used on a variety of metals is explained in Publication B-13. AMERICAN BRASS CO. Pages 74-75.

49 **Portable flame cutting machines** with many new features is introduced. BURDETT OXYGEN CO. Page 82.

56 **Welding positioner for a variety of uses** are featured in Bulletin R1700S11. WORTHINGTON CORP. Page 90.

57 **295-amp AC welder** which offers versatile intermediate rating for general purpose applications is introduced. GENERAL ELECTRIC CO. Pages 92-93.

58 **Ceramic backing rings** and how they help get better pipe welds is the subject of literature available. GENERAL CERAMICS CORP. Page 95.

59 **Removal of welding fumes** at their source is the subject of Bulletin 37-E. RUEMELIN MFG. CO. Page 96.

63 **Arc cutting and gouging** with carbon arc and compressed gases is explained in bulletin which shows typical applications. ARCAIR COMPANY. Page 100.

66 **New heating torch** which gives "super-heat" is introduced in Folder No. 540710. HARRIS CALORIFIC CO. Page 103.

68 **Typical metallizing applications** are featured in descriptive bulletin. METALLIZING ENGINEERING CO. INC. Page 105.

HOW TO BUY ABRASIVE WHEELS

For Quicker Roughing and Finishing on Welds

. . . and get "More Use per Dollar"

Look for a *molded* disc wheel that is specially made in a range of types to meet your particular application.

Make sure the disc you select is built to give long service under heavy duty grinding conditions. Where the abrasive is *molded throughout* the disc you get faster, cleaner cutting action down to the last usable part of the wheel . . . maximum abrasiveness that lasts for hours or days, instead of minutes. A molded disc exposes new and sharp grips with every turn of the wheel, does not become glazed or "loaded". For safe operation on the job, the molded disc should be reinforced with special super-strength fabric and held together with a shock-resistant bond to guard against breakage.

Look for a molded disc made available in a number of rubber or resinoid bond modifications to suit your specific job conditions . . . to give you the needed grinding flexibility to produce a better finish, more easily.

Specify the molded disc wheel engineered to give safe, fast cutting, long lasting service on your job . . . specify Manhattan Moldiscs.

MANHATTAN MOLDISCS

Manhattan Moldiscs are custom-made for your particular type of work on mild steels, stainless alloys, aluminum and copper weldments, castings or forgings. Actual tests have shown that Manhattan Moldiscs outlast 25 to 30 coated abrasive discs, plus additional savings in time and labor normally required for disc changes. They are safe to use because they are light in weight, easier to control and reinforced with special super-strength fabric to prevent breakage. Available types range from harder, stiffer bonds for fast roughing to more flexible or resilient bonds for fine finishing. Whatever your job requirements, Manhattan Moldiscs assure faster metal removal throughout the life of the wheel.

Ask your Manhattan representative to show you why Manhattan Moldiscs, like other types of Manhattan high speed, heavy duty wheels, last much longer . . . give you "More Use per Dollar."

RM-525 WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose
Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

Circle No. 53 on Reader Service Card.

70 **Versatile welding torch,** which can be adapted to a variety of welding, cutting and brazing applications, is featured in Catalog 20. VICTOR EQUIPMENT CO. Page 107.

71 **Tube cut-off machines** for tubing of any diameter or wall thickness is featured in literature. VOGEL TOOL & DIE CORP. Page 112.

74 **Electrode drying ovens** which prevent moisture absorption are described in bulletin. DESPATCH OVEN CO. Page 116.

76 **Clamps for welding,** chisels, punches and drills are featured in new catalog. CINCINNATI TOOL CO. Page 117.

77 **Cobalt - chromium - tungsten hard facing alloys** are featured in free bulletin. CROBALT, INC. Page 118.

80 **Automatic welding equipment,** including pedestal- and seam-welding fixtures and welding positioners, are featured. CAYUGA MACHINE & FABRICATING CO., INC. Page 119.

81 **Trigger-release portable clamps** for welding applications are featured in bulletin 482-4-6. DETROIT STAMPING CO. Page 120.

83 **Weld cleaning hammer** that has five contour forming heads for efficient operation is featured in Booklet Form MP-6. BERNARD WELDING CO. Page 121.

88 **Tong test AC-DC ammeter** and how their use to check amperage can result in better welding is explained in Catalog IW-400. COLUMBIA ELECTRIC MFG. CO. Page 123.

102 **Two lightweight electrode holders,** each with distinctive features, are described in folder. DURO ENGINEERING CO. Inside Back Cover.

The most revolutionary achievement in arc welding equipment in years!

BREN-WELD MODEL 200 AW Patent Pending

FIRST TRULY PORTABLE 200 AMP. OUTPUT ARC WELDER

Weighs only 65 lbs . . Carry it to the job!

OBSOLETES ALL OTHER WELDERS OF COMPARABLE RATING

Dimensions: 11" x 12" x 7½"

Sensational new transformer development produces far more power to pound! The BREN/WELD does work of conventional welders 4 or 5 times its size and weight . . . Actually delivers up to 250 amps at reduced duty cycle.

Simple to use, fully guaranteed, it operates on 110/220 volts AC, 50/60 cycles; handles electrodes from 3/64" to 5/32". Has adjustable arc voltage for different arc characteristics. Ideal for plant production and maintenance, for construction work, railroads, on the farm or home. See your dealer or write direct for details of free trial offer!

KASSON

List Price $169.50 F. O. B. Long Island City, N. Y.

We also manufacture the BREN/WELD ¾" Band Saw Blade Butt Welder.

24 HOUR DELIVERY FROM STOCK!

Manufactured by BRENNEN, BUCCI & WEBER, INC. New York City

Sales Division
KASSON DIE & MOTOR CORPORATION
32-14 Northern Blvd., Long Island City 1, New York

Circle No. 54 on Reader Service Card.

compound Pressure*

the new and better cylinder manifold...

only the bushing turns

threads do it

a very tight seat results

a simple wrench does the job

The new compound pressure* cylinder manifold is made of the sturdiest die forgings and extruded rods; all are drilled for uniform inner dimension. The leak proof joint which results from the compound pressure design is tighter and more leakproof even than the well understood and long used connection between regulator and cylinder valve. The big improvement of this new invention lies in these facts: you can have any competent mechanic assemble a cylinder manifold to your own or our specifications with the assurance of absolute alignment and permanent leak proofness. Yet, the resulting cylinder manifold may be disassembled at any time, stored or moved and reassembled when required. It may be extended when needed, redesigned when desired, stored in bins as individual fittings. Only the bushings move in assembly, thus absolute alignment is certain.

*patents applied for

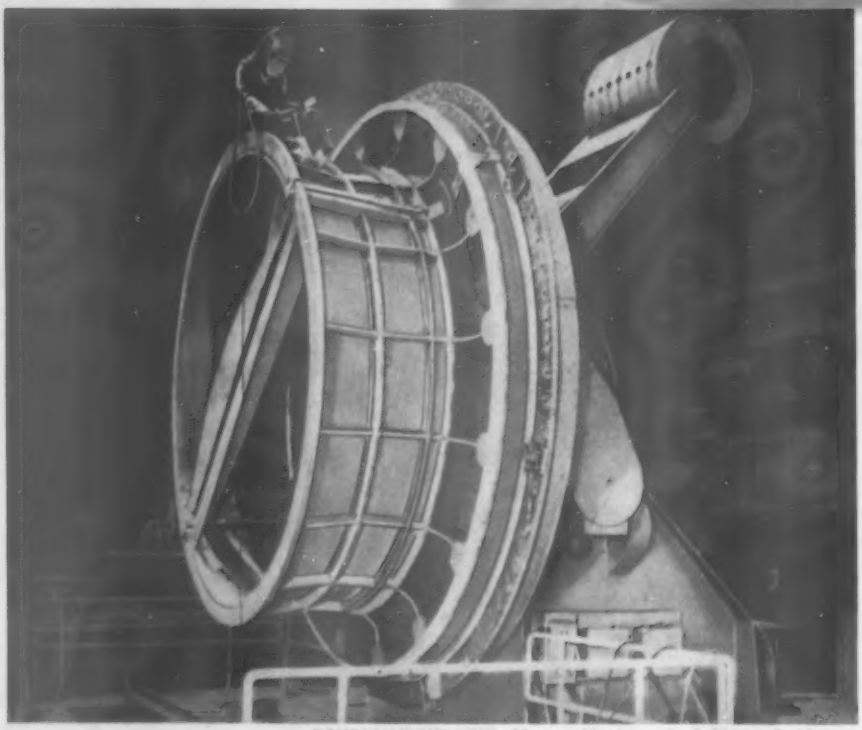
by

National of ...california

NATIONAL welding equipment company... 218 fremont street san francisco 5 california

SSS-M

Circle No. 55 on Reader Service Card.



DOWNHAND WELDING of huge weldments at the S. Morgan Smith Co. is made easy by automatic Worthington welding positioner.

World's largest welding positioner

Handling 64,000-lb weldments was the problem facing engineers in the S. Morgan Smith Company plant in York, Pa. Correct positioning of pieces this big would be exceptionally expensive if ordinary methods were used.

So this leading turbine manufacturer turned to Worthington for help — and got the world's largest welding positioner.

The extra capacity of this Worthington Model 600 Positioner (it's designed for loads up to 50 tons) is matched by many other Worthington "extras". Worthington's top-notch field service and creative engineering background are more reasons why the *important* positioning jobs — large and small — go to Worthington.

Write for Bulletin R1700S11 today. Worthington Corporation, Positioning Equipment Division, Harrison, N.J. V.S.1

WORTHINGTON

Welding Positioners • Turning Rolls

"Drop in and see us at the welding show,
KANSAS CITY, MO., JUNE 8-10
BOOTHS 236-7-8"

Circle No. 56 on Reader Service Card.

Pipeline welding and layout is made easy by use of samples and blackboard diagrams. Limited classes assure each student personal attention from instructor.

HOW TO TEACH PIPE WELDING

by MIKE BADEEN
President and Director
Tulsa Welding School, Inc.

AVAILABLE at Tulsa Welding School, a new pipe layout course qualifies layout welding operators for all plant and refinery fabrication work. Coordinated with the school's regular welding courses, the new course is varied to meet students' needs and requirements.

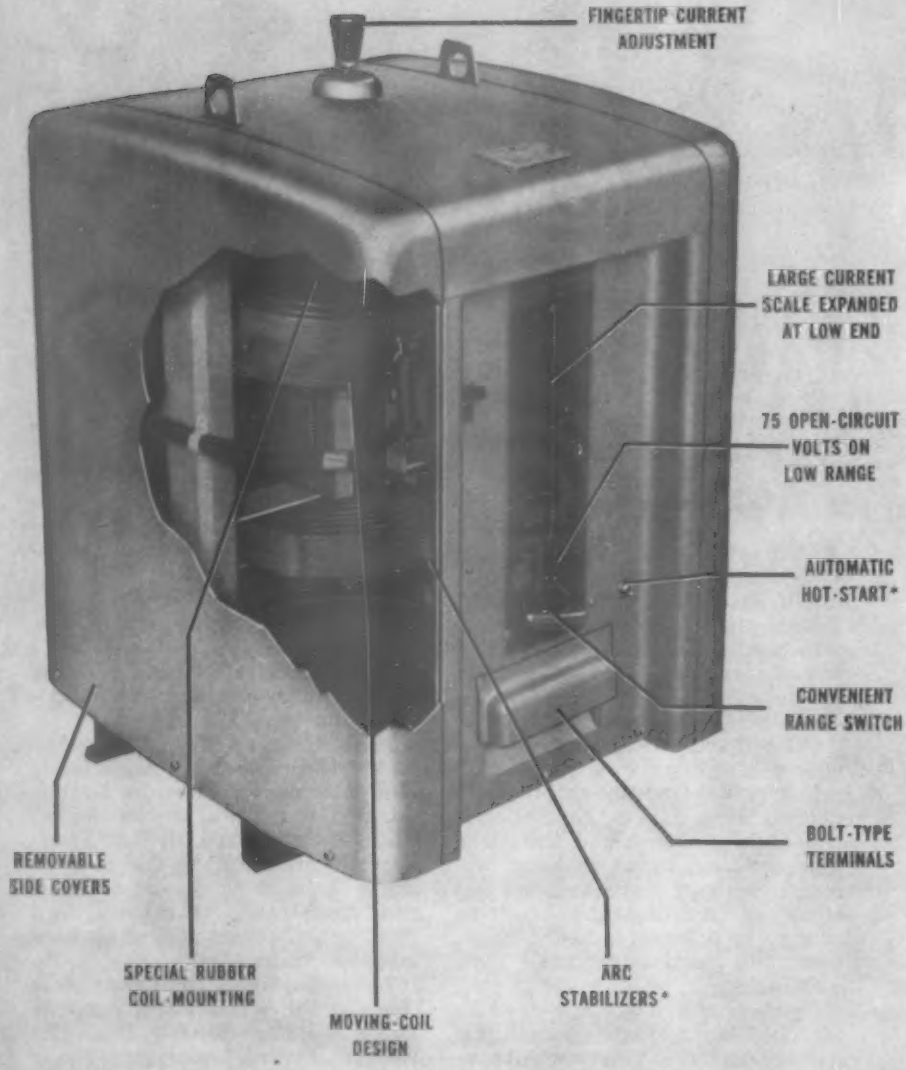
Offered are a 405-hour combined course in pipe welding for pipeline, refinery and industrial pipe, including pipe layout; a 300-hour course in refinery and industrial pipe welding, including pipe layout; a 100-hour course in plate and structural welding and brush-up courses in refinery, industrial pipe, pipe line and structural plate welding.

Courses offered are approved by the Oklahoma State Accrediting Agency and the Veterans Administration. The school is also authorized by the United States Attorney General's office to accept non-immigrant students. This has permitted teaching of pipeline welding to students from Canada, Mexico and South America.

In addition to its curriculum, Tulsa Welding School also is a certified laboratory for testing welding operators and procedures, according to ASME Codes.

The school's central location makes it simple for companies to send their men to Tulsa for testing. Companies utilizing this service include Bechtel Corp. of San Francisco, M. W. Kellogg Co. of New York, Refinery Engineers of Tulsa and Anchorage Plumbing and Heating Co., contractors of air base installations in Alaska.

This testing program has changed the school's full name to Tulsa Welding School, Inc., and Welders Testing Laboratory, Inc.



*Improved Arc-performance Features, Available Optionally

NEW G-E 295-amp a-c welder provides big-welder advantages at a small-welder price—only $237**

G.E.'s new *295-amp* a-c welder brings you a versatile intermediate rating for general-purpose applications. It offers many benefits you would ordinarily expect only from a heavy-duty unit:

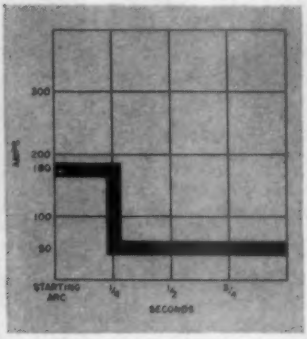
75 OPEN-CIRCUIT VOLTS—permits use of tough electrodes like stainless-steel, low-hydrogen.

MOVING-COIL DESIGN—assures pin-point accuracy in current settings and resettings.

RUBBER-COIL MOUNTING — reduces friction, wear, noise—eases turning of current lever.

UNIVERSAL BOLT-TYPE TERMINALS—base-located to eliminate nuisance of dangling leads.

CONVENIENT RANGE SWITCH—permits changing ranges without unplugging of leads. For details, ask your G-E welding distributor for bulletin GEC-1305. His name is located in the yellow pages of your phone book under: "Welding Equipment." General Electric Co., Schenectady 5, New York. 712-1E



EACH SIDE COVER LIFTS OFF easily, with removal of only 3 screws. Simple inside construction can be serviced quickly and conveniently.

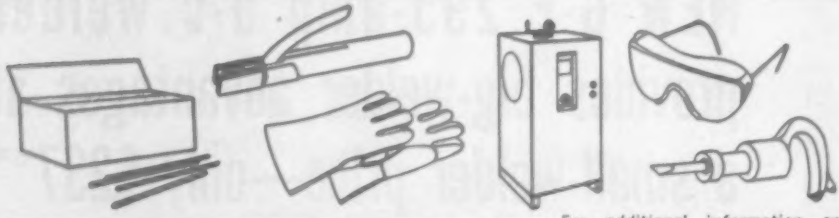
AUTOMATIC HOT-START provides an extra surge of current when electrode touches the work. Arc striking is instant; and sticking is reduced. Result: welding speed is increased and quality improved.

WIDE CURRENT RANGE spans 25 to 295 amps. Permits wide usage—from job shop to light industry. Low end of range is expanded for fine accuracy.

***Mfrs. suggested resale price. Slight additional charge for freight west of Mississippi and Florida*

GENERAL ELECTRIC

Circle No. 57 on Reader Service Card.

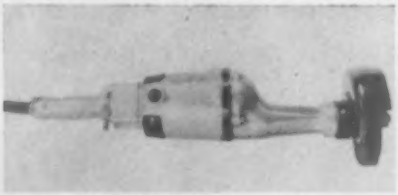


new products

For additional information on the products appearing on this and the following pages, mark the key number of the item on the card bound into this issue. Drop the card in the mail—no postage is required.

Portable Grinder

A new model portable 6" grinder incorporating a more powerful motor weighs 1½ lb. less than previously designed equivalent models made by



Black and Decker Mfg. Co. Also new is an improved cooling fan arrangement which utilizes air flow to keep motor free of dust and carbon. Exhaust air is said to be directed away from the operator. Available for either 115 or 220 volt AC or DC operation.

Circle No. 123 on Reader Service Card.

New Safety Hats Have Pneumatic Cushion

A new type suspension developed to distribute impact from head blows and thus minimizing danger has been introduced by Wilson Products, Inc. "Super-Tough" hard hats and caps utilize a series of plastic air cells between sweat band and shell to absorb and spread impact. Units are said to be readily adjustable.

Circle No. 124 on Reader Service Card.

Torch Cutting Machine

A cutting machine with four torches that may be arranged in a variety of positions has been introduced by Air Reduction Sales Co. According to the manufacturer, cutting range of the machine is 48" by 51" but may be extended

indefinitely by addition of extra tracing tables. Three different tracers — electronic, magnetic, and manual — can be used. All controls are grouped for convenience at the operator's station.

Circle No. 125 on Reader Service Card.

Electrode Moisture Tester

A testing device developed by Weldrod Co. is said to determine electrode coating moisture quickly and accurately. Intended to eliminate need for laboratory testing, the device is useful for fabricators who are welding with stainless steel, low hydrogen or other nonferrous electrodes, according to the manufacturer.

Circle No. 126 on Reader Service Card.

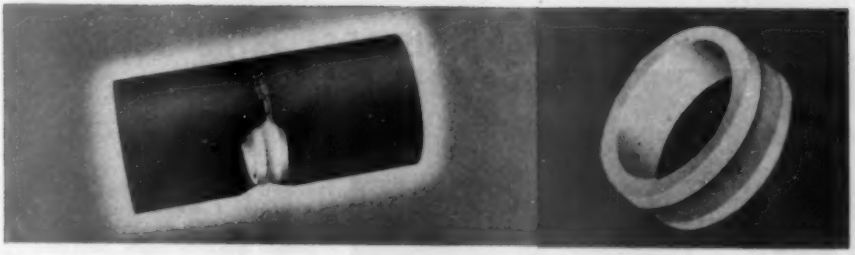
Better pipewelds FASTER!

with new **CERAMIC**

PYROTONE

BACKING RINGS

- IMPROVE WELD QUALITY
- SPEED WELDING PRODUCTION
- REQUIRE LESS SKILL
- EASILY REMOVED WHEN WELD IS COMPLETED
- ADAPTABLE FOR FIELD OR SHOP ERECTION
- WITHSTAND ROUGH HANDLING



PYROTONE Ceramic Backing Rings, "heat engineered" to withstand high arc temperatures, insure proper root fusion. They reduce "test failures," speed welding operations, lower the cost of fabrication, and are completely and easily removable from pipe.

CALL OR WRITE FOR ADDITIONAL INFORMATION

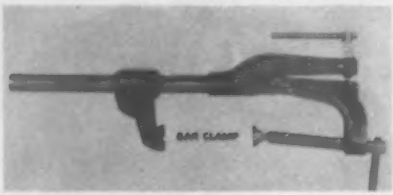
General CERAMICS CORPORATION

General Offices and Plant: KEASBEY, NEW JERSEY

Circle No. 58 on Reader Service Card.

Pipe Bar Clamp

A heavy duty pipe bar clamp developed by Grand Specialties Co. is said to be especially useful for handling bulky



objects. Made of alloy steel, it can be used either vertically or horizontally and has a sliding jaw for quick adjustments.

Circle No. 127 on Reader Service Card.

Combination Shear-Bender

A manually operated shear for bar and angle stock also bends flat bars. Requiring no skill to operate, the unit, called "Metal Worker", will shear aluminum up to 1¼" x 1¼" x ⅜", according to the manufacturer, Wielands, Inc. Weighing only 170 lbs. it is said to be compact and easily mounted.

Circle No. 128 on Reader Service Card.

Plastic Cover Lenses

Clear plastic cover lenses for welding helmets are said to offer extremely good visibility with high scratch and splatter resistance. Introduced by Eastern Safety Equipment Co., lenses are available in a variety of sizes. A companion model lens for burning goggles is also available in a wide range of thicknesses.

Circle No. 129 on Reader Service Card.

Acetylene Torch Outfit

Lightweight acetylene torch outfit shown is part of a kit which includes two handle assemblies, and seven different heads for a full line of heating and soldering work. Heads are said to run cool enough to handle immediately after use. Marketed by Ransome Co., kit includes precision brass regulator, fittings and necessary hose.

Circle No. 130 on Reader Service Card.

REMOVE WELDING FUMES at the Source— with RUEMELIN FUME COLLECTOR

Ruemelin Fume Collector in operation.

Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated AT THEIR SOURCE. Improves working conditions . . . lessens fatigue . . . paves the way for increased plant production. Especially helpful in winter months when windows and doors are closed. Note the new spring-loaded counterbalance mechanism which makes Fume Collectors much easier to handle. Ask for Bulletin 37-E illustrating this new feature.

RUEMELIN MFG. CO. 3891 N. PALMER ST. • MILWAUKEE 12, WIS., U. S. A.
Mfrs. and Engineers • Sand Blast and Dust Collecting Equipment

Circle No. 59 on Reader Service Card.

HENRY
PRATT
COMPANY

welds 3½% Nickel Steel in half the time with

ATOM-ARC
8016N
IRON POWDER LOW HYDROGEN ELECTRODES

For nearly thirty years, the Henry Pratt Company of Chicago has specialized in the designing and building of many types of butterfly valves. The fabricated body shell illustrated above is an example of an unusual butterfly valve made for an unusual service. Installed in a closed-circuit controlled-atmosphere wind tunnel, this Stressed Seal* Butterfly Valve must withstand transonic velocity air streams at temperatures ranging from —100° F. to +650° F.

*Copyright Henry Pratt Co.

FIELD REPORT

CUSTOMER: Henry Pratt Company, Chicago, Illinois.

FABRICATION: 66" and 48" Butterfly Valve bodies of 3½% Nickel Steel to be used in a closed-circuit controlled-atmosphere wind tunnel.

ELECTRODE: ATOM • ARC 8016N—Iron Powder, Low Hydrogen Electrode.

Using ATOM • ARC, no pre-heat required. ATOM • ARC 8016N eliminated costly and troublesome pre-heat procedures on this job making available more man-hours for production welding to get the job done faster for less money.

Using ATOM • ARC, greater weldor ease and comfort. ATOM • ARC 8016N allowed easier *all-position* welding and reduced slag cleaning time to a minimum. Annoying pre-heating and gas fumes were no longer a problem on the job.

Using ATOM • ARC, weld metal deposit was increased 30% with no appreciable spatter loss.

Using ATOM • ARC, no porosity or cracking of any kind in the welds.

SUMMARY: ATOM • ARC reduced welding time and increased weldor efficiency for an impressive overall cost reduction of approximately 50%. And, greater weldor ease and comfort on the job was an important extra. Here are valuable advantages you'll want in your operations—that's why it will pay you to switch to ATOM • ARC right now!

Alloy Rods Co.

Write today for the complete story on Alloy Rods Company's latest development — ATOM • ARC . . . *the only all position iron powder, low hydrogen electrode.*

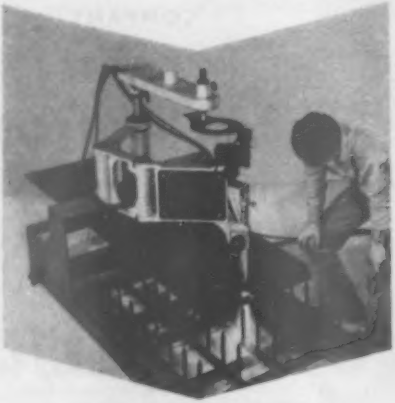
ALLOY RODS COMPANY

General Offices and Plant
Lincoln Highway West
YORK 1, PENNSYLVANIA

Pacific Coast Sales Offices and Plant
750 Lairport Street
EL SEGUNDO, CALIFORNIA

Circle No. 60 on Reader Service Card.

It's Tops



FOR SOLVING FLAME CUTTING PROBLEMS

Small or large—OHMSTEDE's time and labor saving equipment provides faster, easier cutting at lower costs.

Here are 8 big reasons why OHMSTEDE is your best buy.

- Unlimited variety of shapes
- Wide cutting range—cuts 42" dia. circle and straight line of 80"
- Spindle and automatic magnetic tracing
- Operates on either alternating or direct current
- Delivered with base—no extras required
- Sealed ball bearing construction
- Enclosed motor
- Low initial cost—high efficiency

OHMSTEDE flame cutting machines are the end-result of many years of development. Ruggedly constructed, they give trouble-free service and unexcelled performance under all conditions of use.

Write for complete details.

Ohmstede
MACHINE WORKS
897-899 N. MAIN ST. • BEAUMONT, TEXAS

Circle No. 61 on Reader Service Card.

Vernier Height Gage

Especially designed for accurate weld shop checking of large jigs and fixtures, a height gage developed by George Scherr Co., introduces a fine adjustment screw in the base rather than on the slide. Downward pressure on this screw is said to help hold the gage steady, reducing the chance of tipping or tilting it by accident. Available in a variety of sizes.

Circle No. 131 on Reader Service Card.

Weld Planisher

A machine that cold rolls raised weld surfaces, thus flattening the bead and reducing grinding operations has been

introduced by Airline Welding and Engineering. Said to work equally well with a variety of metals, the planisher comes in a wide range of capacities.

Circle No. 132 on Reader Service Card.

Argon Purity Analyzer

An instrument to measure the purity of argon gas has been developed by the Thermco Laboratories. Accurate up to .01 percent, this new unit was designed to continuously analyze production processes in the manufacture of welding grade argon. Analyzer is normally supplied with two scales. For normal operating a range of 90-100 percent argon is used to measure purity of the finished product supplied to the cylinder banks. An auxiliary range of 80-100 percent argon is supplied to measure crude argon or while starting up the purifying column.

Compact and self-contained, unit is ready for operation after making the proper current and sample connections.

Circle No. 133 on Reader Service Card.

Announcing the NEW

MID-STATES *Viking* Heavy Duty Industrial AC and DC ARC WELDERS

Mid-States Viking Inert Gas AC Welder 200-300 rated amps, 230-460 volts.

Mid-States Viking DC Welder 200-thru-400 rated amps, 230-460 volts.

Mid-States Viking AC Welder 200-thru-300 rated amps, 230-460 v.

Select from the Complete MID-STATES Line

Something new and big has been added to the Mid-States Welder line: the New Mid-States Viking AC and DC industrial-duty arc welders . . . proved in performance and recognized for their fine quality.

Mid-States Viking Welders are available in three types to suit every industrial welding purpose:

AC transformer type of 200, 300, 400 and 500 amps rated capacity; DC rectifier type of 200, 300 and 400 amps rated capacity; and the AC inert gas type of 200 and 300 amps rated capacity. The Mid-States Vikings have patented features, unique design and a sturdy construction.

And in the well known Mid-States Welder group of lower amperage units there are sizes ideal for shop use—ranging from 7 to 300 amps capacity. Whatever your arc welding problems may be, light or heavy duty, general or production work, there is a Mid-States to do the job the way you want it done.

Write for literature and details today!

Mid-States 210 AC Welder with No. 10 Missing Link 200 amps, 230 volts.

Mid-States 175 Bulldog 180 amps, 230 volts.

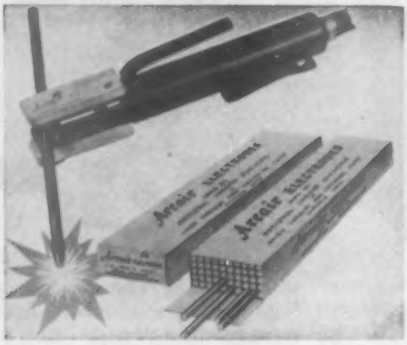
Dealers invited—some good territories open—write for details.

Mid-States WELDER MFG. CO.

6027 SOUTH ASHLAND AVENUE • CHICAGO 36, ILL.

Circle No. 62 on Reader Service Card.

Arcair® TORCH slashes CUTTING and GOUGING costs!



THE Arcair torch gouges, grooves, cuts and bevels all metals, using only an electric arc and compressed air. For the economical answer to many metal-removing problems, use the Arcair torch and genuine Arcair electrodes, plain or copper-coated.

Write for FREE bulletin with facts and photographs of time and money-saving operations performed by the Arcair torch.

ARCAIR COMPANY
429 South Mt. Pleasant Ave.
Lancaster, Ohio

Circle No. 63 on Reader Service Card.

Portable X-ray

An x-ray unit that can be easily stowed in an auto trunk has been developed by Balteau Electric Corp. Lightweight and adaptable to crane mounting for increased versatility, the outfit consists of a control unit, a self contained head, and an accessories kit.

Circle No. 3 on Reader Service Card.

Versatile Positioner

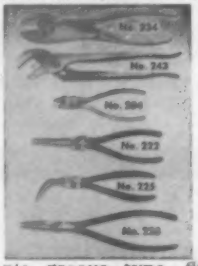
A unit for positioning both weldment and automatic welding head has been

developed by C. B. Herrick Mfg. Corp. Work may be positioned or rotated under welding head that is adjustable vertically and horizontally. Ram and mast rotate 360°.

Circle No. 134 on Reader Service Card.

New Designed Pliers

Six new Proto pliers — a compound leverage type; a multiple groove joint type; a diagonal type, and three nose types — have been announced by the Plomb Tool Co.



The compound type uses a patented three piece design instead of the usual two pieces and holds square, round and even tapered objects. In the multiple groove type, five grooves are engaged by a tongue, a design that prevents slippage and takes much strain off the bolt. Diagonal cutting plier has slim cutting jaws for maximum reach and matched cutting edges are induction hardened. All three needle nose pliers are uniquely designed for getting into restricted areas.

Circle No. 135 on Reader Service Card.

$4000 Saved... by *Hard-Facing*

Rebuilding this worn extrusion screw with HAYNES STELLITE alloy No. 1 costs $2000—$4000 less than a new screw would cost. When rebuilt, the screw will give from 4 to 6 times more service than a new, unfaced one. The screw is used to extrude rubber from a solid to a semi-liquid state, and abrasive wear is the chief problem.

There are 14 HAYNES hard-facing alloys, each developed to resist certain conditions of wear. Some are tough . . . to resist impact, some are hard . . . to resist abrasion, and some resist erosion and heat. Most of them have a combination of these properties — all are easily applied with regular welding equipment.

Your local HAYNES STELLITE dealer carries a complete line of HAYNES hard-facing alloys. Ask him for your free copy of "HAYNES Hard-facing Manual." If you don't know your local dealer, write to Haynes Stellite Company, a Division of Union Carbide and Carbon Corporation, Kokomo, Indiana, for full details.

See... **Your local Haynes Stellite Dealer**

or

Write... **to Haynes Stellite Company**

"Haynes" and "Haynes Stellite" are registered trade-marks of Union Carbide and Carbon Corporation.

Circle No. 64 on Reader Service Card.

Fluted Welding Cable

A welding cable with yellow fluted insulation has been introduced by U.S. Rubber Co. "Royal Gold" cable is said to offer superior impact and moisture resistance, as well as ease of handling and cooler operation.

Circle No. 36 on Reader Service Card.

Portable Seam Welder

A seam welder designed for one-man operation is said to minimize costly set-up by permitting operator to take the

machine to the work. Developed by Cayuga Machine & Fabricating Co., Inc., the machine is said to handle seams from five to twenty feet long.

Circle No. 80 on Reader Service Card.

Flexible Shaft Grinder

A flexible shaft grinder that comes with a hook for trolley mounting is said to eliminate operator fatigue and make

possible finishing operations in limited spaces. Manufactured by Stow Mfg. Co., the grinder has ½ hp motor and can be set at four different speeds.

Circle No. 137 on Reader Service Card.

Low Hydrogen Electrode

A low hydrogen electrode developed by P & H Welding Products Div., Harnischfeger Corp., is said to provide arc stability, easy start and restart, and a greatly increased deposition rate as compared to conventional low hydrogen electrodes. Named DH-170, it is available in sizes from $\frac{3}{32}$" to ¼".

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CHECK THESE EXCLUSIVE ADVANTAGES

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ELECTRODE HOLDER

—and You'll Wonder Why

You're Not Using them NOW!

- Spring completely enclosed and insulated. Cannot be knocked or shorted out.
- Spring Adjustment Screw for ease of replacement and adjustment to rod size.
- Handle cannot absorb moisture—withstands higher temperatures.
- Tip insulators reversible for longer service life.
- Low Trigger for ease of Rod relief—cuts down operator fatigue.
- Slender rod gripping tongs to get in tight places.

Get the complete story. WAGNER Products are sold only through Welding Supply Distributors throughout the U. S. and Canada.

Weld with Wagner

WAGNER MANUFACTURING CO.

250 W. 1st SOUTH ST. JACKSON, MISSOURI

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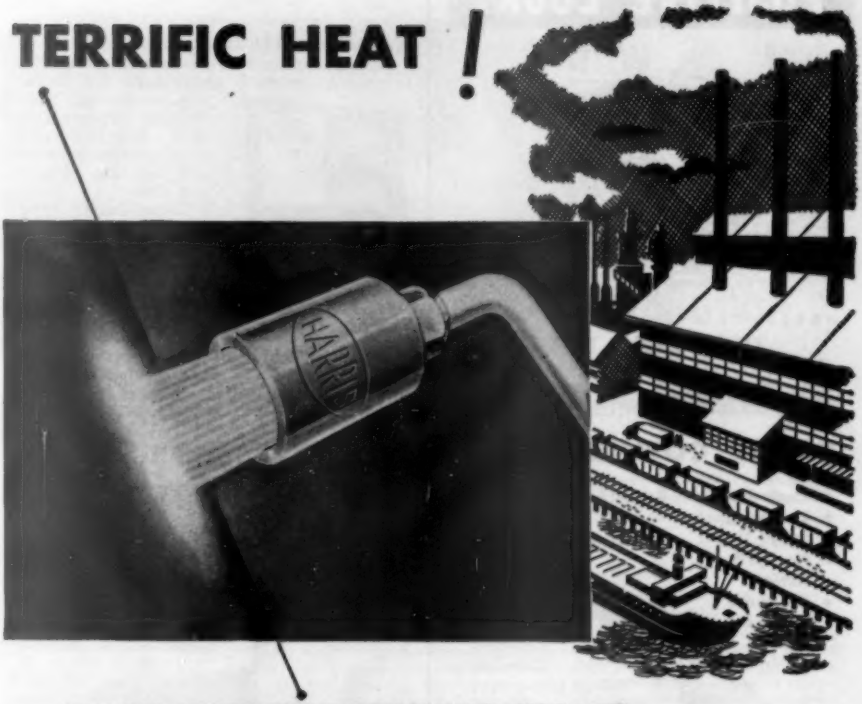
TERRIFIC HEAT !



HARRIS SUPER-HEAT TORCH NO. K23

Heat is the Prime Factor utilized in connection with innumerable Metal Working Operations. While it is a fact that the Oxy-Acetylene Welding Torch is universal in its applications, there are many Operations requiring a much greater volume of Intense Heat than can be obtained from a Welding Torch.

A definite limitation exists relative to the amount of Oxygen and Acetylene Gases which can be safely mixed without danger of the Flame "Back-firing", due to the extremely fast Flame Propagation Characteristics of such Gas Mixtures. On the other hand, much larger volumes of such Fuel Gases as Propane, City Gas and Natural Gases can be safely mixed with Oxygen on account of their lower rate of Flame Propagation. It is evident the larger the volume of Gases mixed, the greater the Flame and resulting Heating Value. This produces the truly phenomenal results achieved by this Harris Super-Heating Torch.

The applications of this Harris Torch are unlimited, where large volumes of Intense Heat are required, either as a Portable or Stationary Unit. In places where Massive Shafts are to be Straightened; Large Size Pipe Bent; Flanging or Straightening of Steel Plates; Brazing Heavy Copper Pipe, etc., etc., this Harris Torch, with its **TERRIFIC HEAT**, is the answer.

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THE HARRIS CALORIFIC CO.
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- Locks Tight!
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- No Spring Action!
- Releases Easily!

Exclusive Cam-Lok design guarantees positive, vibration-proof connection. Locks tightly in about ½ turn. No spring tension, no weaving or moving of contact surfaces, therefore, no arcing, burning, or freezing.

COMPARE POSITIVE LOCK and these CAM-LOK features with your present connectors:

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2. Connects instantly, all cables from #2 to 4/0 **without adapters and without tools.**
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4. Fiber insulation pin, **arcing impossible.**

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Induction Heating Generators

Small, compact, economical electronic induction heating generators for brazing, soldering, hardening, annealing and melting are now available from the Induction Heating Corp.

These bench type Ther-Monic units are said to have the latest circuit developments permitting maximum power from generator with practically any type of work coil and cover a range from 1 to 75 KW. Easy to operate, generators are provided with two output work stations controlled by solenoid operated selector switch. Single operator unloads and reloads the one station while the other station is heating.

Circle No. 139 on Reader Service Card.

Radiography Device

A device for remote handling of Iridium 192 in industrial radiography has been introduced by Gamma Corp. Called an Iridium isotron, it allows sources of up to 75 curies to be exposed at distances up to fifty feet from the operator, who can expose the source while remaining behind a concrete wall or personnel shield. The isotron was specifically designed for shots that cannot be handled conveniently with ordinary x-ray equipment.

Circle No. 140 on Reader Service Card.

Lightweight Welder

This small, hand-carried welder weighs only 59 lbs. and welds with a 5/32" electrode on any single phase 110 volt line. The welder, known as the Royal Arc 200A, is a product of Royal Arc Industries, Inc.

The unit cuts, brazes, solders, preheats and can be used to hard-surface parts. The low maximum load output of the Royal Arc welders eliminates the danger of electrical shock. Low voltage results in minimum carbon precipitation to reduce brittleness in the weld.

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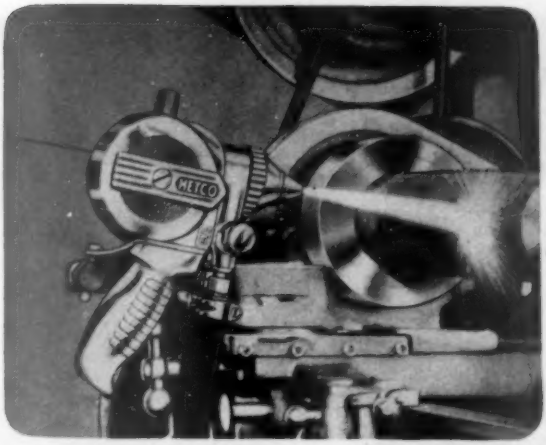


now a really low-cost metallizing installation...

with the new Metco L-Gun

New, low, compressed-air requirements . . . only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor . . . bring metallizing within reach of the small user.

Metallizing damaged journals on turbine shaft

Building up worn brake-drum

Metallizing protective coating on steel plate

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
- Do your own hard-facing,
- Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

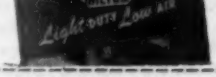
Sprays 23 Different Metallizing Wires—With the new L-Gun you can spray .10, .25, .80 carbon steels, stainless; babbitts, brass, bronze; nickel, aluminum, tin, zinc; special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

It's Versatile—Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb. 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.*

Same High Quality as Other Metco Guns—The low air requirements of the new L-Gun have been achieved without any sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

A Real Opportunity for the Smaller Shop—Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



See other examples of metallizing illustrated in our 8-page Bulletin in your Sweet's Plant Engineering File—Section 7a/Me.

The following names are the property of Metallizing Engineering Co., Inc.: Sprabond Wire, Metco-Weld, Metco*. *Reg. U.S. Pat. Off.

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In Great Britain:
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

DON A. WATSON
METALLIZING ENGINEERING CO., INC.
1125 Prospect Ave., Westbury, Long Island, N. Y.

☐ Please send me more information about metallizing.
☐ Please arrange a demonstration in my shop.

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Company_____
Street_____
City_____ Zone____ State_____

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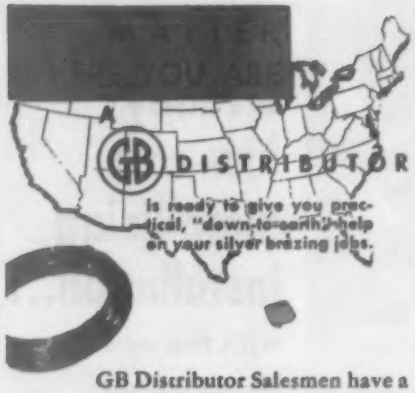

GB Distributor Salesmen have a broad background of practical experience, as well as technical know-how in silver brazing applications. One of these men is in your area. He'll supply working samples of GB alloys and fluxes and help with your brazing problems.

Each GB standard Silver Brazing Alloy is developed for specific cost and production requirements. They are all available in the illustrated easy-to-use forms.

Call your GB distributor for all the facts. (If you don't know his location, simply write for his address.)

GB FLUXES . . . available in three main types to cover the low temperature silver brazing range:
GB No. 99—working range up to 1350° F
GB No. 88—working range up to 1650° F
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GB FLUXES . . .
Dissolve metallic oxides readily
Provide uniform flow of silver brazing alloy
Insure high joint strength

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1304 W. 54th Street, Chicago 36, Illinois

Circle No. 69 on Reader Service Card.

Soldering Tools

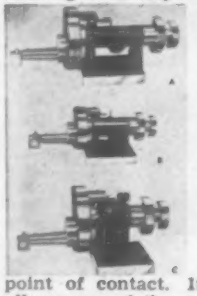
Sixteen different styles of soldering tools offering permanent built-in elements hermetically sealed in cast aluminum are now being marketed by Paul

C. Roche Co., Inc. under the trade name, "ZEVA". Tools are said to have easily replaceable solid copper tips with adjustment for exact temperature requirements. Tools offer range of 30 to 800 watts.

Circle No. 142 on Reader Service Card.

Wheel Dressers

Three new models of wheel dressers, offering a variety of features and work capacities have been announced by the Last Word Sales Co. Model A can be used to dress any angle tangent to a radius, concave or convex, in any precision grinding wheel. A reported advantage of this dresser is that it permits dressing at the base of the wheel or point of contact. It is stated that this allows use of the wheel guard and dust collector even during dressing operation.

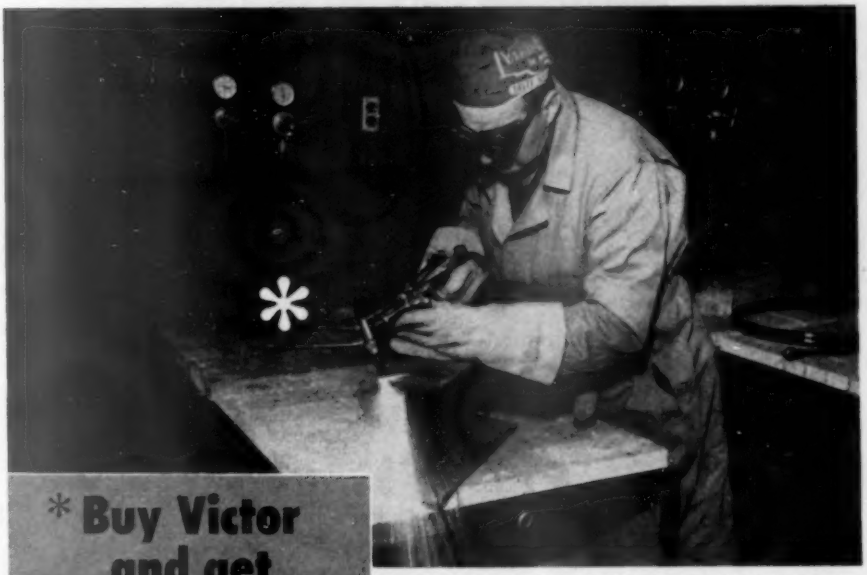


Circle No. 143 on Reader Service Card.

Lightweight Engine Generators

Portability has been stressed in the introduction of two new engine generators produced by Wincharger Corp. Model F2500 delivers DC current, has an output of 2500 watts with four-115 volt outlets and weighs 148 pounds. Model F3000 delivers AC current, has 2000 watt continuous capacity and 3000 watts starting capacity, four-115 volt outlets and also weighs 148 pounds. With the Wisconsin AKN and Briggs & Stratton No. 14 engines supplied with these units, sufficient power is available to operate portable tools.

Circle No. 144 on Reader Service Card.

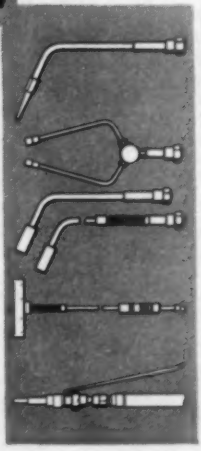


* Buy Victor and get Torch Versatility

Cutting with VICTOR Model 300 Series Torch Butt and Model 2450 Cutting Attachment; cuts to approximately 8"

The versatility of VICTOR torches means you can buy exactly what you need for today's job, then add other nozzles, tips and attachments as required. Your equipment grows with your needs; stays custom-fit to your work. For example, here are a few of the 34 standard attachments for VICTOR 300 Series Torch Butts.

Start *right*. Buy the versatile VICTOR torch that grows with your job. See it at your VICTOR dealers *today* . . . or write NOW for Catalog 20.



Welding . . .
Here's one of 10 standard single-tip nozzles available for general welding and preheating.

Heating, Brazing . . .
You have your choice of 11 standard multiple-tip or multiflame nozzles for preheating, brazing, silver soldering, etc.

Descaling, Flame Priming . . .
Save time and money with VICTOR attachments that fit your exact needs.

Automatic Gas Saver . . .
Shuts off welding gas, keeps pilot light on, saves as much as 75% of total gas consumption.

14

VICTOR for welding

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; hardfacing rods; blasting nozzles.

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SAN FRANCISCO 7

3821 Santa Fe Ave.
LOS ANGELES 58

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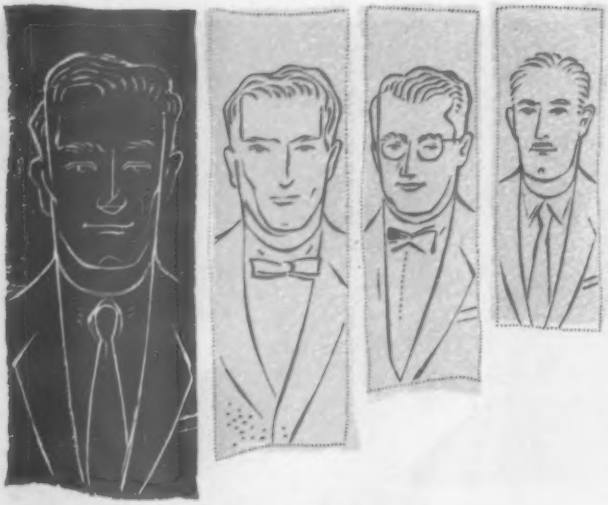

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You can reduce weight, improve appearance, cut costs and speed delivery when you . . .

SUBSTITUTE WELDMENTS FOR HEAVY CASTINGS

SUBSTANTIAL savings in time, labor and materials are realized by substituting weldments for large, heavy castings. How and why this was done in one specific case emphasizes the general efficiency of welded versus cast construction.

One of the best known manufacturers of broaching machines, Lapointe Machine Tool Co., has turned to welded bases for their heavier machines. This has allowed greater flexibility of design and thus eliminated the necessity for standardizing on a limited number of machine models.

The job of fabricating one of the largest Lapointe bases for a 100-ton vertical broaching machine, was given to Framingham Welding & Engineering Co., Framingham, Mass. The Engineering Department, responsible for planning the job, also supervised construction of the huge 17-ton weldment, which was 18 feet high and 5 feet wide.

Among the many reasons for deciding to fabricate this base by welding were the time and weight factors involved. Instead of a bulky casting weighing almost 30 tons and taking several months to complete, the fabricated base weighed about 17 tons and was delivered in 16 days. This included two weekends and 37 hours of heat-treating time, so actual fabrication required only 10 working days.

In addition to the substantial weight saving, actual cost of the fabricated unit was very much lower. Considering the many patterns and molds necessary for a casting this size, and the amount of grinding and machining involved, the cost would have been prohibitive.

Welded fabrication allows greater flexibility of design. Changes

Welding and finishing simultaneously saves time on 17 ton machine base.

can be made even during actual welding, as their need arises. Expensive patterns required for cast construction, make design changes a costly operation.

Castings require extensive handling during finishing operations. This cost factor was reduced by Framingham Welding and Engineering Co. The company delivers a sandblasted and prime coated weldment. Using proper grinding techniques and materials, the operators are able to turn out products with a high quality finish at much lower cost even than unfinished castings.

The versatility of welded construction is very important to Lapointe. This technique has made it possible for the company to compete for the very lucrative business in tailor-made, non-standard machines. This has contributed largely to their success.

Substitution of weldment and quick finishing procedure for previously used casting largely eliminates need for costly machining.

Preparation for Welding

After drawings were carefully studied, procedures for preparation and welding were determined. It was decided to use flame cutting to prepare all sections of the base for welding. The material, type 1020 hot rolled steel, varied in thickness from ½" to 3". Most important part of the fabrication was the 2½" thick center section. All cutting, edge bevelling, rolling and forming was handled on standard equipment.

After breaking down the various jobs into operations and departments, the Engineering Department specified rolling and forming pro-

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New Revised Edition of The Pocket Manual of Arc Welding

Valuable Data — the new Pocket Manual of Arc Welding contains latest welding application data of value to foremen, supervisors, inspectors and operators—in concise, easy-to-read form.

You'll use it Every Day — in your shop work. The new Pocket Manual of Arc Welding provides practical on-the-spot information on many arc welding problems. Written from the standpoint of welding supervisors and operators, it fills a longtime need in the industry.

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172 Interesting Pages

Written by **Lew Gilbert**, editor of INDUSTRY and WELDING this "down-to-earth" Pocket Manual can be used as a welding department guide as well as a text book for operator training programs. It contains a large variety of new reference data in the form of charts, diagrams, welding symbols, efficient joint details, etc.

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Please send me.....copies of the (POCKET MANUAL OF ARC WELDING) at $1.00 each. Check or money-order in the amount of $..... is attached.

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cedure, mainly on presses, and carried out inspection of component sections for proper size and condition. These were then assembled and tack welded.

Actually, after preliminary planning, construction of the huge base was comparatively simple. The 2½" thick section, directly behind the ways was welded between two 1" thick side plates. These members must take the machine's operating load. Some of the welded joints are subjected to pressures of 100 tons since the base must support the vertical ways and driving mechanisms of the broach tool. Obviously, procedure and weld quality were very important.

How the Base was Welded

Utilizing positioners and various types of jigs, fixtures and holding devices, supervisors arranged all component sections for downhand welding.

For the critical strength members, high quality E6020 electrodes were used. Speed of deposition was an important factor in choosing this type. In the deep butt joints, multiple passes were deposited.

The high quality weld metal, which results from refinement of each layer, was carried into a reinforcement layer which was eventually ground off into smooth contours.

Because of a greatly accelerated production schedule and the importance of grinding from an appearance standpoint, it was decided to test a wide variety of wheels before selecting one. As a result of this extensive testing, a new reinforced disc wheel made by Bay

FOR YOUR POWER PRESS

THE VOGEL TUBE CUT-OFF MACHINE

HIGH PRODUCTION: In your power press the VOGEL TUBE SHEAR cuts any diameter or wall thickness of tubing within range of machine from 1/3 to 1 second per cut.

MINIMUM BURR: Cuts square ends with minimum of burr.

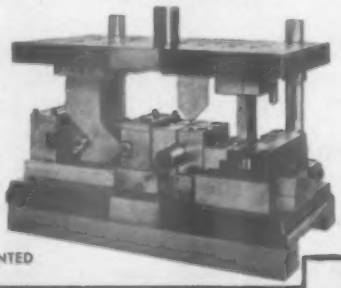
LOW MAINTENANCE: Simplicity of design with few moving parts insures low maintenance. "Set-up" can be done by anyone with very little training.

INTERCHANGEABLE: Die blocks available to cut tubing sizes from ⅛" O.D. to 2" O.D.

AUTOMATIC STOP: Holds lengths to plus or minus .010" cut from any mill lengths of tubing.

No. 12 VOGEL CUT-OFF MACHINE
Takes tubing up to ½" O.D. x 3/32" wall.

No. 2 VOGEL CUT-OFF MACHINE
Takes tubing up to 2" O.D. x ⅛" wall.



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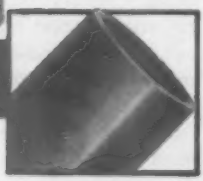
SEND FOR SAMPLE CUTS AND DESCRIPTIVE LITERATURE



VOGEL TOOL AND DIE CORPORATION

1819 N. 32nd Ave. Melrose Park, Illinois
Fillmore 5-0160

Circle No. 71 on Reader Service Card.

State Abrasive Products Co., the BF-Blue Flash (specifications A-24 R—BF), was adopted. It proved to be extremely fast cutting.

The new wheels, used on portable air operated grinding tools, not only removed excess weld metal more quickly and with safety, but also produced an acceptable finish which required no further attention. Although no serious wheel breakage has ever occurred in this plant, guards are used on all grinders as a precautionary safety measure.

Quality Control and Safety

During fabrication, and after final heat treating, very careful control of the weldment is the responsibility of Engineering. Procedures are checked to be sure there has been no distortion or deflection. Magnetic particle inspection is carried out to check for surface or slight sub-surface flaws. Periodic spot checks by x-ray are used—upon request—to determine quality of deeper, heavier sections.

Welding fume exhausters, both central overhead systems and smaller, portable units are utilized for greater operator comfort and safety.

Proper protective clothing and goggles are used by all operators during welding, handling and grinding.

Industry Mourns Passing of Fred C. Archer

Fred C. Archer, 56, president of Fred C. Archer, Inc., and Blueweld, Inc., died recently at his home. Well known in the welding industry, Mr. Archer was a member of the American Welding Society.

Mr. Archer came to Milwaukee in 1936 as district manager of the Lincoln Electric Co. He started his own business in 1946.

THIS IS
BASIC
The bitterness of poor quality lingers long after the sweetness of low price is forgotten.
It is to your best interest never to forget that there is no Santa Claus in the RESISTANCE WELDING ELECTRODE business.
Whenever price is CUT, quality is CUT! The reasons given you for price cutting are those the price cutter wants you to hear. That is the time to beware, because substitutions can be made in tip manufacture that cut cost and quality, yet are not apparent in the finished product until it is used.
No one can do business long without a profit. When a tip price is CUT, something is taken out. That something is QUALITY . . . and its loss will be in proportion to the price cut. If you buy cut-price tips, expect to get cut-quality tips. It is basic that you never get more than you pay for.
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FINISH WELDS FASTER

ONE COMPACT UNIT, gear-shift selection of 4 or 5 speeds up to 12,000 RPM. Put one motor to work before and after welding for BRUSHING, GRINDING, BLENDING-IN.

4 & 5-SPEED Strandflex GEAR DRIVE eliminates countershafts, drive belts and pulley changes. You can change speeds by little more than a flick of a finger . . . no need to use tools. QUICK-CHANGE COUPLING lets you change attachments with a simple PRESS-PULL-SNAP action. FROM JOB TO JOB, the unit can be moved easily on a wide variety of portable mountings. In use, the operator lifts only the lightweight handpiece, not the heavy motor . . . thus reducing fatigue and increasing production.

NEW CATALOG describes FULL LINE of Strand Flexible Shaft Machines, including direct drive and countershaft models with up to 3 HP; also accessories and tools. See your distributor or write direct for Catalog C-2106.

FRANKLIN BALMAR CORPORATION
N. A. STRAND DIVISION
Woodberry, Baltimore 11, Maryland
5001 N. Wolcott Ave., Chicago 40, Ill.

Circle No. 72 on Reader Service Card.

HIGH-TEMPERATURE BRAZING . . .

(Continued from Page 62)

faces with a solvent before assembling.

Solvents used for cleaning, or for wiping after cleaning, should be oil-free types, such as ether, acetone, or carbon tetrachloride.

Handling the cleaned surfaces with bare hands should be avoided, since finger marks are difficult to remove and can interfere with flow of the alloy.

Assembling and brazing the parts immediately after cleaning is the ideal procedure. However, this is not always possible. In the event of any delay between cleaning and brazing, the cleaned, dry parts should be kept in air-tight containers or wrappers. Tightly-closed metal containers, cellophane or vinyl plastic bags are very effective. Waterproof paper, if used, should be of a type that is free of oil, wax, or any other contaminating agent.

Effective joints can be made with components that have been sprayed with these new brazing alloys, provided that the parts are brazed immediately after spraying, or protected in storage as described in the preceding paragraph. Sprayed parts should not be held for more than 48 hours before brazing.

Use of Fluxes

These alloys are self-fluxing when used in atmospheres of dry hydrogen, argon or helium. With dry hydrogen, a dewpont of -60°F or lower is required. In other atmospheres, it is sometimes necessary to add a small amount of flux to protect the brazing powder and parent metal surfaces. Potassium

pentaborate is satisfactory, but its quantity should be limited to a maximum of 15% of the weight of the brazing alloy. Prepared mixtures of wet flux and brazing alloy may be used, provided they are mixed in this same proportion.

High temperature fluxes which contain fluorine should be avoided, since the new brazing alloys do not flow readily in its presence.

The use of flux is recommended when brazing in an atmosphere of hydrogen formed from cracked ammonia, to avoid the formation of nitrides on the joint surfaces, which would prevent proper wetting.

Surfaces on which the brazing alloy is placed by spraying can be brazed in an atmosphere without the use of flux.

Alloy Forms Available

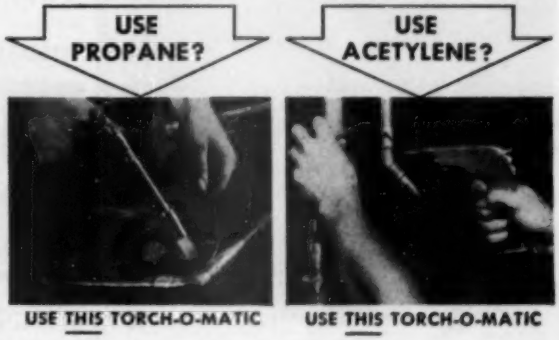
These high temperature nickel brazing alloys are hard and nonforgeable as furnished by the manufacturer. They are available in the following forms: cast rod, powder, wire, strip, and washers. The last three forms are made of alloy powder mixed with an organic binder.

In addition, powders can be mixed with acryloid resin which has been thinned with carbon tetrachloride. This mixture will produce satisfactory results in a dry hydrogen atmosphere. Also available is a special oil with which the alloy powders can be mixed. The paste made in this way can be stored for an extended period of time, and will produce satisfactory results in certain types of applications.

The high-nickel brazing alloys, which are the subject of this article were developed for Coast Metals, Inc., by A. T. Cape, research consultant, North Hollywood, Calif. Patents have been applied for.

(To Be Continued)

Whichever Torch-o-matic you use— exclusive trigger-control saves you time, saves you fuel!



With either the Propane or Acetylene Torch-o-matic, you get the *exclusive* trigger-control feature that *eliminates* lighting-up, adjusting, and open-flame hazards. Just pull the trigger and it lights; release the trigger, it's out! With the Propane Torch, pulling the trigger completely back lengthens the flame from a pin-point to a full 6-inches. This *automatic* on-off flame control saves you time when you're using Torch-o-matic; saves you gas when you're not! Write for complete details on either or both Torch-o-matics.

VELOCITY POWER TOOL COMPANY 201 North Braddock Avenue Pittsburgh 8, Pa.

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Eutectic Offers $300 In Awards

Marking production of its billionth electrode, Eutectic Welding Alloys Corp. will include a "Gold" electrode somewhere in its forthcoming shipments. Finder of this specially marked rod will receive an award of $100 on presenting it to his local Eutectic dealer. Four other marked electrodes will be worth $50 each to the finder.

The awards are part of activities in observance of the company's fifteenth anniversary. Founded in 1940, its formation climaxed 40 years of research carried out under direction of Rene D. Wasserman, president of Eutectic.

Inco Opens Lab to Press

New electrodes and a new alloy will be introduced on April 14 by International Nickel Co., Inc., at a press conference which will include a tour of the firm's new plating facilities.

M & T Promotes Morgan

Donald K. Morgan has been named general Sales Manager of Metal and Thermit Corp. to succeed retiring Vice President, John B. Tinnon. Tinnon will remain with the company as consultant. Morgan formerly held down a post with Kirby Machine Co. Most recently he has been assistant to Mr. Tinnon.

KILL moisture absorption with DESPATCH ROD DRYING OVENS

It's an accepted fact that certain electrodes in storage tend to gather moisture and CO_2. This applies to low-hydrogen, stainless steel and non-ferrous electrodes. The amount of moisture is related not only to the percent of relative humidity, but also to the length of time that electrodes are stored. Despatch "WRD" Welding Rod Ovens provide lots of storage room in 10 spacious compartments and do a thorough, steady, dependable dehydrating job. *Specifications:* Outside dimensions—18"x19"x18", Max. Temp. 550° F; 250 lbs. rod capacity. *Write for Bulletin.*

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Canadian Trade Fair Shows Welding Equipment

For the first time the Canadian International Trade Fair will include a Welding and Metals section which will display a wide variety of welding and metal fabricating equipment. Organized in cooperation with the Canadian Welding Society, the show will be staged in Toronto from May 30 to June 10. A number of technical papers and exhibits on welding will be presented by the Society.

Design Engineering Show Postponed

The Design Engineering Show, scheduled to be held in Philadelphia in May, has been postponed until late Spring, 1956, it was announced by Clapp & Poliak, Inc. The show will then run concurrently with the Design Engineering Conference, according to the release from the exposition management firm. The Design Engineering Show has been planned to supplant the Basic Materials Expositions held in recent years in New York and Chicago.

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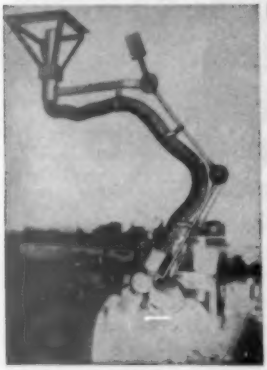

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Technical Services At Hudson

Hudson Welding Supply Co., Inc. has announced plans for free technical services to welding users in the Hoboken, New Jersey area. According to H. Lowen, general sales manager, the firm will also hold welding clinics, evening courses and plant demonstrations.

Linde Picks Two

Eugene Easterly has been appointed Vice President in charge of distribution and E. G. Hickling, Vice President in charge of operations, according to T. D. Cartledge, president, Linde Air Products Division of Union Carbide and Carbon Corp. Together the appointees represent over half a century of service with Linde.

Product Help Offered

Assistance to small firms in product research, development, marketing and related activities is offered by the federal Small Business Administration in a new pamphlet available on request at all SBA field offices.

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AWS Wins Award for Overseas Aid

A Certificate of Cooperation has been awarded the American Welding Society for its participation in the technical assistance program of the Foreign Operations Administration. Shown holding the citation is J. H. Humberstone, president of the Society. He is flanked by members of a team from Iceland which just completed an eleven week study of welding in this country.

Brunswick Announces Expansion Program

According to James D. Bluhm, vice president, Brunswick Oxygen Co. will expand its sales operation in New Jersey. Formerly concentrated in central Jersey, Brunswick will now cover all of northern New Jersey as well. The company handles Arcair, All-State, Linde and Westinghouse among other brands.

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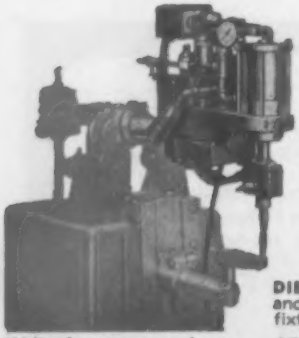
Here's an Old Saw

Ingenious weldor transformed five foot circular saw blade into serviceable outdoor table by welding a half-inch iron band around blade's circumference. Band is tacked to each tooth. Center leg is a two inch pipe placed directly under blade's spindle hole. This allows use of large umbrella. Four pieces of inch pipe bent into "U" shape make braces and legs.

National Electric Picks Fisher and Knight

Simon Fisher has been named General Manager and D. L. Knight, Plant Manager, at National Electric Welding Machines Co. Fisher, a director of the firm since 1947, has been with the company since 1935. Knight started at National in 1941.



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Worthington Boosts Meiter

William A. Meiter has been named General Sales Manager of Worthington Corp. replacing T. J. Kehane who has been appointed Vice President in charge of sales. With Worthington since 1927, Meiter was most recently Central Sales Manager.

Eutectic Records Training Course

In an imaginative step toward promoting use of low heat input joining techniques, Eutectic Welding Alloys Corp. has issued a two-hour album of long-play recordings featuring selected lecture material from its Welding Institute. Records, together with a 60-page manual, give simplified introductory data on basic metallurgy, heating methods, torch and electrode manipulation.

The records are free on a loan basis when available from Eutectic District Engineers and are intended to service those who cannot trek to the company's headquarters at Flushing, N. Y. for the Eutectic institutes.

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Inert Arc Welding Produces Jet Aircraft Parts

Producing the thousands of parts needed in just one jet aircraft has brought about production problems perhaps never before encountered by many plants sub-contracted to fill these military orders. Due to strict Government regulations, jet parts must pass X-ray inspection and must be produced at a rate to maintain uninterrupted production at final assembly points.

With these "musts" in mind the engineers at the Monument Engineering Co., Inc. of Indianapolis, one of the many jet aircraft parts manufacturers, decided that by using the inert-gas shielded arc welding process these requirements could be met.

Many Sizes and Shapes

Most of the parts manufactured at Monument are of different metals with varying thicknesses, and many must be welded into intricate shapes, contours and compound angles. By using the manual inert arc process all of these "normal" problems were solved and in an economical way.

The paramount advantages in using inert arc in fabricating these jet parts, or any parts where clean, smooth, flat welds are vital, are that the process allows for flexibility during welding of parts which vary in numerous ways; resultant narrow welds are free from

hot cracking and undercutting along joint edges, and since no flux is needed because of the argon gas which shields the arc and weld puddle from the atmosphere, cleaning and finishing of parts is reduced to a minimum.

Nelson Stud Resumes West Coast Manufacture

Resumption of limited stud manufacture at its San Leandro, California plant has been announced by Nelson Stud Welding Division of Gregory Industries, Inc. Verne Bender, Western Regional Manager, said the facilities will help supply special studs not readily available in warehouse stocks.

American Brass Plans New Mill

Construction of a new brass mill with an expected annual capacity of 30,000,000 pounds will be undertaken soon in the Paramount district of Los Angeles, according to a release from John A. Coe, Jr., President, American Brass Co.

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Norton Announces Shifts

Norton Co. has announced the appointment of L. G. Holfelder and J. A. Coleman as "abrasive engineers" for the central Indiana and Kansas City, Missouri areas respectively. Both are former members of the firm's Sales Engineering department. At the same time, R. B. Goodale has been named Field Engineer at the company's Chicago office.

Holfelder

Coleman

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Available At No Charge
See Page 28

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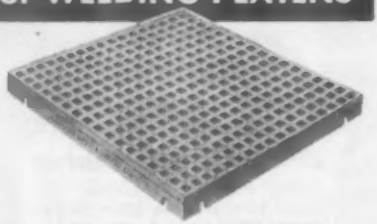

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Welded Tank Needs Special Trailer for Road Service

A special trailer had to be built to haul this 50,000 gallon fuel storage tank, one of fifteen made by Massachusetts Engineering Co., Quincy, Mass. The tanks were entirely welded with the new type iron power coated electrodes which cut welding time in half. Tanks, made of ⅜" plate are 102' long, 10'-6" in diameter and each weigh 46,000 pounds. Picture and data courtesy Lincoln Electric Co.

One of the largest fuel storage tanks ever to travel over the roads, this tank was welded with iron powder coated electrodes.

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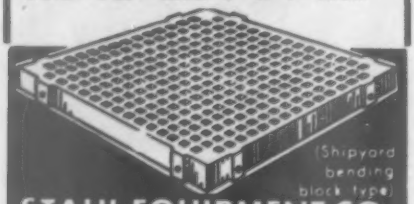

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AWS Spring Meeting Has Record Registration

Largest advance registration for any American Welding Society event was reported recently by J. H. Humberstone, president, for the forthcoming National Spring Meeting and concurrent welding show to be held at Kansas City, Mo., June 7 to 10.

The show will be the largest in its history and will exceed, in number and variety of exhibits, the record breaking show held in Buffalo last May.

P&H Features Welders at Western Metal Exposition

A combination A-C, D-C welding machine was one of the new welding developments featured by Harnischfeger Corp. at the recent Western Metals Exposition. Also featured were a high frequency AC welder, a new rectifier welder and several gasoline engine-drive machines. Welding positioners and electrodes were also shown.

BETTER WELDS • CLEANER WELDS
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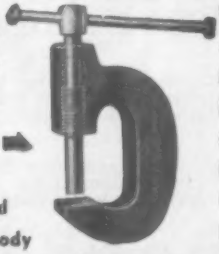
WELDING CLAMPS



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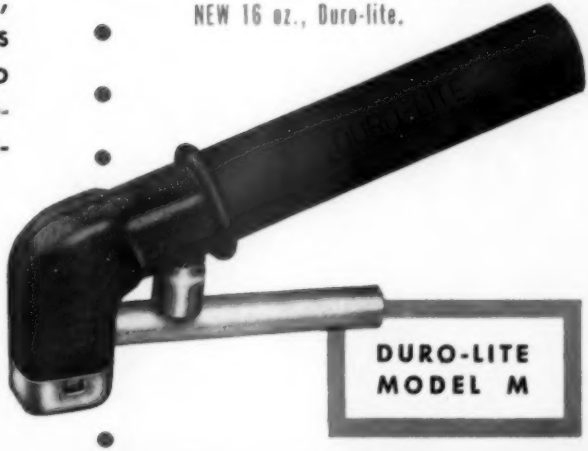

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Mark Both Of These Dates On Your Calendar!

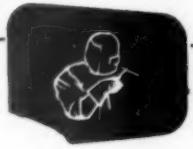
MAY 18, 19, 20

THE NATIONAL WELDING SUPPLY ASSOCIATION'S
11th ANNUAL CONVENTION
EDGEWATER BEACH HOTEL • CHICAGO, ILLINOIS

Plan to attend if you can. If you cannot be there, read all about it in the May Issue of Industry & Welding.

JUNE 8, 9, 10

THE AMERICAN WELDING SOCIETY'S
3rd ANNUAL "ALL WELDING" SHOW
MUNICIPAL AUDITORIUM • KANSAS CITY, MO.



If you are planning to attend, read the June issue of Industry & Welding for "What to See and Hear at the Show." Use it as your guide to exhibitors and technical programs. Plan your visit before you get there.

- If you cannot attend, use the June issue of Industry & Welding as your eyes and ears—as your "Show Case." Complete coverage of the show will include lists of exhibitors, descriptions and illustrations of new equipment, and editorial presentation of new products, equipment and techniques.

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